DOCUMENT RESUME

ED 226 334 CS 007 010

AUTHOR Anders, Patricia L., Ed.
TITLE Research on Reading in Secondary Schools. A Semi-Annual Report. Monograph Number 9.
INSTITUTION Arizona Univ., Tucson. Coll. of Education.
PUB DATE 82
NOTE 110p.
PUB TYPE Reports - Research/Technical (143) -- Collected Works - General (020)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Advance Organizers; *Cognitive Processes; Cognitive Style; Content Area Reading; Inservice Teacher Education; *Reading Instruction; *Reading Research; Recall (Psychology); Research Utilization; Secondary Education; Sex Differences; Study Skills; Teaching Methods
IDENTIFIERS *Reading Strategies

ABSTRACT

Part of a continuing series intended for use by reading professionals interested in understanding and improving the reading of adolescents, this report contains four articles dealing with subjects of current interest. Topics covered in the articles are (1) the effects on readers' recall of directions describing passage structure, signaling, and elaboration; (2) learning styles and content area reading instruction; (3) applications of the research base in secondary level reading; and (4) analyzing reader strategies. The report also provides several articles that comment on research previously reported in this series. (FL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED226334

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization orginating it.

Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

RESEARCH ON READING IN SECONDARY SCHOOLS

A Semi-Annual Report

Monograph Number 9

Edited by

Patricia L. Anders
Reading Department
College of Education
University of Arizona
Tucson, Arizona
85721

SPRING, 1982

CS207010

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Patricia L. Anders

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EDITORIAL ADVISORY BOARD

Editor:

Patricia L. Anders, Ph.D.
Associate Professor
Department of Reading
College of Education
University of Arizona
Tucson, Arizona 85721

Editorial
Advisory Board:

Wilbur S. Ames, Ed.D.
University of Arizona

Joseph L. Vaughan, Ed.D.
East Texas State University

H. Alan Robinson, Ph.D.
Hofstra University

Ken L. Dulin, Ph.D.
University of Wisconsin-Madison

Carol Lloyd, Graduate Assistant
University of Arizona

Table of Contents

Editorial Board i

Table of Contents ii

Purchase of Monographs iv

Order Form v

Submission of Manuscripts vi

Acknowledgements vii

Department of Reading Symposium's CALL FOR PAPERS viii

From the Editor ix

Effects of Directions Describing Passage Structure, Signaling, and Elaboration on Reader's Recall

Wayne H. Slater
Rebecca J. Palmer
Michael F. Graves
University of Minnesota 1

Learning Styles and Content Area Reading Instruction

Richard P. Santeusanio
Danvers Public Schools and
Salem State College 26

Secondary Reading: Applications of the Research Base

John J. Carney
University of New Hampshire. 35

Table of Contents
Continued

Toward a Method of Analyzing
Reader Strategies

Pi A. Irwin
Tucson Unified School District
Judy Nichols Mitchell
University of Arizona 58

REFLECTIONS 82

Reflections on:
SQ3R: Retread or Retire?

James E. Walker
Northern Illinois University 83

Reflections on:
And Did He Say It, or Did She?
Selected Gender-Related Variables
and Mature Reading Response

Paula J. Gaus
Fairfield University
Fairfield, Connecticut 86

Reflections on:
The Effects of a Content-Area
Reading Institute upon
Teacher Planning

Lynne Miller
University of Arizona 89

Reflections on:
Is Practical Significance
Practical?

Priscilla V. King
University of Arizona 92

PURCHASE OF MONOGRAPH

This monograph is the ninth in a series of semi-annual reports of research related to reading in the secondary schools. The monograph is supported by the Department of Reading of the University of Arizona for the purpose of disseminating research findings to professionals in reading who are interested in understanding and improving the reading of adolescents.

Issues one through four and issue six of this monograph are available through ERIC Document Reproduction Service: number 1, Ed 117 509; number 2, ED 177 510; number 3, ED 184 052; number 4, ED 191 004; and number 6, ED 203 286. Issue 5 is available through the Department of Reading at a cost of $3.50 per monograph. Issues 7, 8, and 9 are available at a cost of $4.00 each. Checks should be made payable to the Reading Research Monograph and forwarded to the University of Arizona, Tucson, Arizona, 85721.

For your convenience, an order form has been included on the following page.

Editors: Please send the monographs indicated below:

	Unit Cost	# Desired	Amount
Monograph #5 - Spring, 1980 (Teacher education, methodology, and critical reading)	$3.50	_____	_____
Monograph #7 - Spring, 1981 (Skills and concepts, A Language Shaping Paradigm, Anaphoric Relationships, Teacher Training, Research Methodology, and Propositional Analysis)	$4.00	_____	_____
Monograph #8 - Fall, 1981 (Comprehension, Listening, Content Area Research, Gender Variables, Ethnographic Data)	$4.00	_____	_____
Monograph #9 - Spring, 1982	$4.00	_____	_____

Please send check or money order (we cannot accept invoices, etc.) payable to READING RESEARCH MONOGRAPH to:

READING RESEARCH MONOGRAPH
Department of Reading
College of Education
University of Arizona
Tucson, Arizona 85721

We regret that Monographs #1 through #4 and #6 are sold out. Copies may be obtained through any library with an ERIC microfiche collection, or may be ordered from:

ERIC Document Reproduction Services
P.O. Box 190
Arlington, Virginia 22210

Listed below is the information you will need for ordering through ERIC Document Reproduction Services.

TITLE	ED#	NUMBER OF PAGES
Monograph #1	ED 177 509	56
Monograph #2	ED 177 510	87
Monograph #3	ED 184 052	77
Monograph #4	ED 191 004	82
Monograph #6	ED 203 286	99

SUBMISSION OF MANUSCRIPTS

This monograph series is planned and published as a non-profit enterprise by faculty and doctoral students in the Reading Department at the University of Arizona. Each article submitted is independently reviewed by at least three members of the editorial board. Subsequent issues are planned that will include specific research studies, theoretical papers that emphasize a need for research, and reviews of literature. Articles that deal with any of these areas are being actively solicited if they (1) are of interest to reading professionals on the secondary level, (2) are primarily directed to research, and (3) have not previously been published elsewhere. It is intended that this monograph reflect, not dictate, the trends and interests of reading professionals in secondary education. Please do not hesitate to submit manuscripts which share ideas, research, or experiences that might encourage others to build upon your work and ideas. Send manuscripts by October 15 to be considered for Fall publication; send manuscripts by March 15 to be considered for Spring publication.

One unique aspect of this series is that the editorial board is particularly interested in receiving papers from doctoral students and from assistant professors. It is our belief that many of the professionals in these categories do not publish their research findings because of a perceived and existing difficulty of "breaking into the publishing game." We hope to encourage "first-time" authors by providing such an opportunity and encourage such prospective authors to submit papers or questions to the editors.

The response to our effort has been most gratifying. As you may well appreciate, the production and dissemination of a new publication is hardly an easy task. In fact, as we succeed, the task becomes increasingly more complex. Our future success depends upon the degree to which our colleagues join us in generating research and in reporting their findings.

P.L.A.

ACKNOWLEDGEMENTS

A debt of gratitude is owed Dean Robert F. Paulsen, College of Education, for his continued encouragement in the production of this monograph.

A special thanks to Dr. William J. Valmont, Head of the Department of Reading, for his support in producing this monograph.

Special thanks is also due to Ms. Laurie Deurloo and her fine support staff for the preparation of this issue.

All materials in this monograph have been copyrighted (c) 1982. All rights reserved. No part of any of this publication may be printed, reproduced, or transmitted in any form or by any means without prior permission from the editor.

CALL FOR PAPERS

The University of Arizona Department of Reading

announces

DIMENSIONS: MULTIDISCIPLINARY CONTRIBUTIONS

The Fourth Annual Pacific Region Reading Research Symposium

in conjunction with

FOURTEENTH ANNUAL UNIVERSITY OF ARIZONA READING CONFERENCE

November 19-20, 1982, Tucson, Arizona

. . . . . .

***Theoretical and research studies related to the field of reading are requested for presentation in 30-45 minute sessions, to be followed by reaction and discussion.

***Abstracts of approximately 200 words should be submitted for review no later than September 1, 1982.

***Author's names, titles, professional affiliations, addresses, and telephone numbers should appear on a cover page submitted with each abstract. A 50-75 word biographical sketch for inclusion in the program should also appear on the cover page.

***Selected program speakers will be notified by October 1, 1982.

***PLEASE NOTIFY THE CHAIRPERSON AS SOON AS POSSIBLLE ABOUT YOUR INTENT TO SUBMIT A PROPOSAL, EVEN THOUGH ABSTRACTS ARE NOT DUE UNTIL SEPTEMBER 1, 1982.

CONTACT: Dr. Stephanie Lea Brown, Chairperson
Pacific Region Reading Research Symposium
Department of Reading
College of Education
University of Arizona
Tucson, Arizona 85721

Equal Opportunity/Affirmative Action Title IX/Section 504 Employer

FROM THE EDITOR

About This Issue

The response to our call for papers for the present monograph was tremendous. We had the pleasure of reviewing over 50 manuscripts which was very gratifying. Please keep the manuscripts coming as the quality of our monograph is certainly dependent upon our contributors.

Included in this edition of Research on Reading in Secondary Schools are four articles which should each add to our knowledge of adolescent reading. Slater, Palmer, and Graves have investigated "three features of text - elaboration, signaling, and explicit directions . . . - on ninth grade students' written recall of an expository passage." The suggestions these authors make in their discussion of their results should serve as food for thought and further investigation by many of us.

Santeusanio's article was characterized by one reviewer as "interesting, but mainly leaves the reader with a lot of questions." This was precisely why it was chosen. If teaching and learning occur within the context of an interaction between teacher and pupil(s), then investigations of that interaction should be of importance. Perhaps as Santeusanio suggests, instruments now exist to investigate this interaction.

Carney synthesizes the research base for secondary reading instruction. Carney's categories of research results and their instructional implications should offer the reader a handle by which to grasp the current "research emphasis which seeks to understand how knowledge is acquired through text."

Irwin and Mitchell discuss the need for techniques to carry out process-oriented research. They review the goals and methodology employed in other studies which have attempted to identify the strategies readers use in comprehending text. Finally, they offer a strategy classification system based on recall data of 24 adolescents reading multiple samples of expository and narrative text. This paper provides an original and scholarly view of the comprehension process.

The reactions we received to our new "Reflections" section were gratifying. Many of our readers responded most thoughtfully to the issues and ideas discussed in previous monographs.

The Next Issue

Manuscripts for the fall edition of the monograph should be sent to us no later than October 15, 1982. Of course, we will accept manuscripts at any time for future issues.

Patricia L. Anders

Effects of Directions Describing Passage Structure, Signaling, and Elaboration on Readers' Recall

Wayne H. Slater, Rebecca J. Palmer, and Michael F. Graves
University of Minnesota

Current work in the development of textual grammars and in discourse analysis employing textual grammars (Fredericksen, 1975; Grimes, 1975; Kintsch, 1974; Meyer, 1975; Turner & Greene, 1977) has the potential for identifying a variety of textual features which facilitate readers' recall of text. The number of features which might facilitate recall of text is nearly limitless, certainly larger than could be investigated in a single study. The present study, therefore, investigates a selected set of such features. More specifically, the present study investigates the effects of three features of texts--elaboration, signaling, and explicit directions describing the passage structure--on ninth grade students' written recall of an expository passage.

One line of research motivating the present study is that on elaboration. As defined by Craik and Tulving (1975), elaboration is the process of adding specific concrete information to simple sentence frames. Thus the sentence, "The great bird swooped down and carried off the struggling puppy," is more elaborated than the sentence, "The bird carried off the puppy." In a series of experiments, Craik and Tulving (1975) demonstrated that more elaborated sentences resulted in "more elaborate encoding and superior memory performance" (p. 284) as measured by both free recall and cued recall tasks. Among the other factors that Craik and Tulving suggest influenced subjects' recall in these experiments were the amount of material presented and the time spent studying this material. One assumption underlying the present study was that elaboration involving units larger

than the sentence would similarly result in more material presented and more time spent studying the material and consequently in improved recall.

A second line of research motivating the present study is that which has investigated the relationship between readers' recognition of the organization of a passage and their recall of information from that passage. In one study in this area, Meyer, Brandt, and Bluth (1980) examined the extent to which good and poor ninth grade readers used the author's organization in writing recall protocols immediately after reading a short text. Results indicated that most good readers used the same organization as the author of the text in their protocols while most poor readers did not. Results further indicated that students who used the same organization as the author of the text recalled significantly more information than those who did not. In a recent replication of the Meyer et al. study, Palmer, Slater, and Graves (1980) again found that good readers used the author's organization in writing recall protocols much more often than poor readers, and that readers who used the author's organization recalled much more than those who did not, in this case nearly twice as many propositions. A second assumption underlying the present study was that directly explaining the organization of a passage to students before they read it would facilitate their recognizing that organization and in turn recognizing the organization would facilitate their recalling the passage.

The third line of research motivating the present study is that which has investigated the relationship between signaling and subjects' recall of information from prose passages. Signaling is described by Meyer (1975) as the use of headings, side headings, or phrases embedded in the text which highlight specific ideas or aspects of the organization of the text. For example, in a passage organized with a response rhetorical predicate (a

type of organization in which the author first presents a problem and then presents the solution to the problem), the author might focus the reader on the top-level structure with signaling by the explicit use of the labels problem and solution. Meyer (1975) hypothesized that passages employing signaling would produce greater written recall of the passage content than passages which did not employ signaling. In general, results of Meyer's study, which used Cornell University students as subjects, indicated that the influence of signaling on recall was small and did not produce statistically significant differences. However, most comparisons of passages with and without signaling showed that the signaled versions of the passages produced better recall than the non-signaled versions. In a replication of Meyer's study using junior college students as subjects, Marshall (1976) found larger and statistically significant differences indicating that signaling did aid written recall. And in a later study, Meyer, Brandt, and Bluth (1980) found some indications that signaling aided the recall of poorer ninth grade readers but not of better ninth grade readers. In summary, there is some evidence that signaling aids recall, at least with less able students. The third assumption underlying the present study was, thus, that signaling may aid written recall.

Based on these three assumptions--that elaboration, directions explaining the organization of a passage, and signaling would facilitate written recall--two hypotheses were formulated. The first was that elaboration would facilitate recall and use of the author's organization. The second was that a combination of directions explaining the organization of a passage and signaling would facilitate recall and use of the author's organization. The decision to combine signaling with directions explaining the organization of the passage was made because the effect of signaling by itself had been shown to be small and the results were inconsistent.

Method

Subjects

Subjects for the study were 104 ninth graders enrolled in a four year Catholic high school in a middle-class suburb of Minneapolis. Approximately half of the subjects were designated by the school as high ability students and half were designated as low ability students on the basis of test scores, grades, and teachers' rankings. However, discussions with the school staff revealed that the school enrolled largely average and above average students. Thus, most of the students in what is called the low ability group were of average ability.

Materials

Materials consisted of four versions of a prose package on supertankers (Ball, 1975) and two sets of directions.

Version One of the passage was titled "The Problem with Supertankers and Its Solution" and included two side headings which clearly identified the organization of the passage. The first of these side headings was "The Problem," and the second of them was "The Solution." Version One also included a number of specific details which directly supported the major ideas presented in the passage. It was 274 words long, contained 96 propositions, and was rated as being at the seventh-eighth grade level by the Dale-Chall formula (1948). The complete text of Version One is shown in Figure 1 below. Version Two of the passage had the same title and subheadings as Version One. However, it differed from Version One in that it

Figure 1

THE PROBLEM OF SUPERTANKERS AND ITS SOLUTION

The Problem

Over the past ten years, a number of supertankers have been built and used to ship oil. Supertankers are very large and can carry much more oil than regular size ships. However, supertankers sometimes have accidents and spill their oil. Stopping oil spills from supertankers is a big problem. The usual supertanker carries a half-million tons of oil and is as long as five football fields. The oil from wrecked supertankers kills fish, birds, and plant life. A recent wreck off Alaska killed all the salmon in a 30 mile area. When a tanker sank off the coast of England, more than 200,000 seagulls died. And an oil spill off the California coast killed off all the seaweed for a period of three years. Most wrecks are caused by the lack of power and the lack of steering gear needed to handle emergencies such as storms. Most supertankers lack power because they have only one boiler to provide power and one propeller to drive them. Most supertankers lack adequate steering gear in that they have only one rudder.

The Solution

Some people have said that the solution to the problem of supertankers is to stop using them. However, this is not a good solution. We should not stop using supertankers because 80 percent of the world's oil is carried by them. Instead, the solution is to improve the training of ships' officers and build better ships. First, ships' officers must be thoroughly trained to handle the ships in emergency situations. Second, ships must be built with at least two boilers and two propellers to provide power and with two rudders to give them adequate steering capabilities.

did not include specific details supporting the major ideas. It was 121 words long, less than half as long as Version One, and contained 61 propositions. It also was rated as being at the seventh-eighth grade level by the Dale-Chall formula (1948). The complete text of Version Two is shown in Figure 2 below. Version Three of the passage was simply titled "Supertankers and had no subheadings; otherwise, it was the same as Version One.

Figure 2

THE PROBLEM OF SUPERTANKERS AND ITS SOLUTION

The Problem

Over the past ten years, a number of supertankers have been built and used to ship oil. Supertankers are very large and can carry much more oil than regular size ships. However, supertankers sometimes have accidents and spill their oil. Stopping oil spills from supertankers is a big problem. The oil from wrecked supertankers kills fish, birds, and plant life. Most wrecks are caused by the lack of steering gear needed to handle emergencies such as storms.

The Solution

Some people have said that the solution to the problem of supertankers is to stop using them. However, this is not a good solution. Instead, the solution is to improve the training of ships' officers and build better ships.

Version Four of the passage was also simply titled "Supertankers" and had no subheadings; otherwise, it was the same as Version Two.

As noted above, the materials included two sets of directions. One set of directions explained that there are a number of ways of organizing writing, that the passage to be read was organized in a manner in which a problem was first presented and then a solution to the problem was presented, and that students should identify the problem and solution as they read the passage. It also noted that students were to write down all they remembered from the passage immediately after reading it. The other set of directions simply noted that students were to write down all they remembered from the passage immediately after reading it.

In all cases, the detailed directions were combined with the versions of the passages which included signaling. Thus, students got one of four sets of materials: (1) a set that included detailed directions coupled

with signaling and the elaborated version of the passage, (2) a set that included detailed directions coupled with signaling and the unelaborated version of the passage, (3) a set that included brief directions without signaling and the elaborated version of the passage, and (4) a set that included brief directions without signaling and the unelaborated version of the passage.

Design and Analysis

The study employed three independent variables, each of which had two levels, and two dependent measures. The independent variables were ability (high, low), elaboration (elaborated, unelaborated), and directions and signaling (present, absent). (Again, it should be noted that directions and signaling functioned as a single variable; a subject received both detailed directions and a passage with signaling or neither detailed directions nor a passage with signaling.) The dependent measures were the number of propositions subjects recalled and a score indicating the extent to which subjects followed the author's organization.

A three-way analysis of variance was used to analyze the results with respect to the number of propositions recalled, and a series of Chi-square analyses were used to analyze the results with respect to subjects' following the author's organization.

Scoring

The first step in scoring the protocols was to construct a hierarchically arranged display of the content structure of each of the two versions of the passage using Meyer's (1975) system of analysis. This analysis yielded an ordered list of the content units and relationship units of each version of the passage (See Appendix A). Protocols were then scored to

determine the number of propositions they included, with each proposition being given equal weight. Finally, the protocols were again scored, this time using the Meyer, Brandt, and Bluth (1978) system which yielded an indication of whether or not the top level organization of each protocol matched that of the passage.

Procedures

Students were tested in their classes by their classroom teachers. All treatments were administered within each of the classes tested. A test booklet containing one of the four treatments was given to each student. Students were told that they were participating in a study designed to determine how students read and remember information and that they should read the directions in the packet, read the passage given, and write down all they could remember about the passage. All students were given as much time as necessary to complete the reading and write the recall protocols.

Results

Results with respect to the number of propositions recalled will be presented first. Table 1 shows the mean number of propositions recalled for each level of ability, elaboration, and directions and signaling. As can be seen from the table, high ability students recalled more propositions than low ability students, students receiving the elaborated versions of the passage recalled more propositions than those receiving the unelaborated versions, and students receiving the versions of the passages with directions and signaling recalled more propositions than those receiving

Table 1

Mean Number of Propositions Recalled for Each Condition of Ability, Elaboration, and Directions and Signaling

Ability	High 30.13	Low 24.87
Elaboration	Elaborated 29.02	Unelaborated 26.17
Directions and Signaling	Present 27.88	Absent 27.53

the versions without directions and signaling. However, the analysis of variance indicated that only the difference due to ability was statistically significant, $F(1, 96) = 7.77$, $p < .05$, and as is obvious from the table, the difference due to directions and signaling is virtually nonexistent. Moreover, the analysis of variance further showed that none of the interactions were statistically significant. However, one of the interactions, while not statistically significant, is suggestive and worth noting. This is the ability x elaboration x directions and signaling interaction shown in Table 2 below. Inspection of the cell means indicates that while low ability students generally recalled less than high ability students, the low ability students who received the elaborated version of the passage and directions and signaling demonstrated recall approaching that of the high ability students. More will be said about this result in the discussion.

Table 2

Mean Number of Propositions Recalled for Each Combination of Ability, Elaboration, and Directions and Signaling

	High Ability		Low Ability	
	Directions and Signaling		Directions and Signaling	
	Present	Absent	Present	Absent
Elaborated	31.38	30.31	28.73	25.08
Unelaborated	28.00	30.92	20.37	23.00

The analyses of the extent to which students followed the author's organization in writing their recall protocols produced similar but not identical results. The number of students rated as following and not following the author's organization at each level of ability and for each condition of directions and signaling and of elaboration is shown in Table 3 below. As can be seen from the table and as is suggested by the Chi-square analysis, significantly more high ability students, X^2 (1) = 7.26, $p < .01$, used the author's schema, and students used the author's schema significantly more frequently, X^2 (1) = 3.89, $p < .05$, when given directions and signaling than when not. However, the use of elaboration did not significantly affect students using the author's organization in recall protocols.

Table 3

Number of Subjects Following and Not Following the Author's Organization for Each Condition of Ability, Directions and Signaling, and Elaboration

	Ability	
	High	Low
Followed	47	29
Did Not Follow	9	19

	Directions and Signaling	
	Present	Absent
Followed	41	35
Did Not Follow	9	19

	Elaboration	
	Elaborated	Unelaborated
Followed	41	35
Did Not Follow	15	13

As was the case with respect to number of propositions recalled, the three-way interaction obtained with scores indicating use of the author's organization is worth noting. This interaction is shown in Table 4 below.

Table 4

Number of Subjects Following and Not Following the Author's Organization for Each Combination of Ability, Elaboration, and Directions and Signaling

	High Ability			
	Elaborated Passage		Unelaborated Passage	
	Directions and Signaling		Directions and Signaling	
	Present	Absent	Present	Absent
Followed	10	13	14	10
Did Not Follow	3	3	0	3

	Low Ability			
	Elaborated Passage		Unelaborated Passage	
	Directions and Signaling		Directions and Signaling	
	Present	Absent	Present	Absent
Followed	12	6	5	6
Did Not Follow	3	6	3	7

Inspection of the table shows that relatively the same proportion of high ability students followed the author's oganization regardless of whether or not the passage was elaborated or whether or not detailed directions and signaling were used. However, the situation is quite different with low ability students. Only about half of the low ability students followed the author's organization when detailed directions were not used. But when detailed directions and signaling were used, even with the unelaborated version of the passage, over 60% of the low ability students followed the author's organization. And when detailed directions and signaling were used with the elaborated version of the passage, 80% of the low ability students followed the author's organization, this percentage being approximately equal to the percentage of high ability students that followed it. Note that this combination of treatment conditions--the elaborated version of the passage with directions and signaling--is the same combination that facilitated low ability students' recall of propositions.

Discussion

Certainly, results obtained from a single experiment can only be suggestive. Nevertheless, we believe that the results of the study are interesting and that the suggestions that arise from the results are worth considering. One major result of the study is a negative one. Specifically, major textual changes failed to have much effect on the majority of the students who participated. Doubling the number of words in the passage and increasing the number of propositions by 50% failed to have a significant effect on the number of propositions recalled. To be precise, doubling the number of words in the passage and increasing the number of propositions it contained by 50% resulted in only about 10% more propositions being re-

called. Moreover, this increase in number of words and propositions had virtually no effect on whether or not most students followed the author's organization in their protocols.

Similarly, the use of directions and signaling to highlight the organization of the passage generally had relatively little effect. It increased the number of propositions recalled by only 1%. And while use of directions and signaling did significantly increase the number of students who followed the author's organization in their recall protocols, it is certainly to be expected that using the headings problem and solution and telling students to look for the problem and its solution as they read the passage would result in their following that organization in their written protocols. Moreover, the value of following the author's organization, when following that organization does not result in improved recall, as was generally the case in this study, is questionable.

This negative result would seem to be of concern to those looking for ways to facilitate students' learning from text. And we believe that it should be. Certainly, one hopes that students don't learn just as well from much briefer and less clearly organized material as they do from longer and more clearly organized materials. Yet that is precisely what much of the data from the present study suggests. However, we believe that there are three aspects of the present study which may explain these results and that suggest directions for further research on learning from text.

One aspect of the study which we think needs to be changed if further research is to produce positive results is that of the amount of active student involvement the treatments require. The students' roles in the present study were totally passive with the exception of writing the recall

protocols. We will certainly design future treatments so that students are forced to be more reactive. Note, however, that most current texts make no more demand for students' active involvement than did our treatment.

A second aspect of the study which we think needs to be changed in at least some future studies involves the directions that are given to subjects. In the present study, students were directed to read the passage a single time and more or less to read straight through it at their normal rate. This has been the practice in a number of studies similar to the present one; and, unfortunately, it is frequently the practice of students when reading their school texts. Nevertheless, it is certainly not the way to study, and if what is measured is the amount remembered and the accuracy of what is remembered, subjects need to be told to study the text with care.

The final aspect of the study that we would question is the use of written recall as the sole dependent measure. For one thing, remembering everything, at least one task posed by recall, usually isn't the goal of reading, even of reading a textbook. For another, written recall protocols may reflect as much about how much students care to write as about how much they remember. There are other potential problems with recall, but our major points are that recall ought not to be used exclusively and that just what recall reveals, or for that matter what many dependent measures reveal, ought to be questioned.

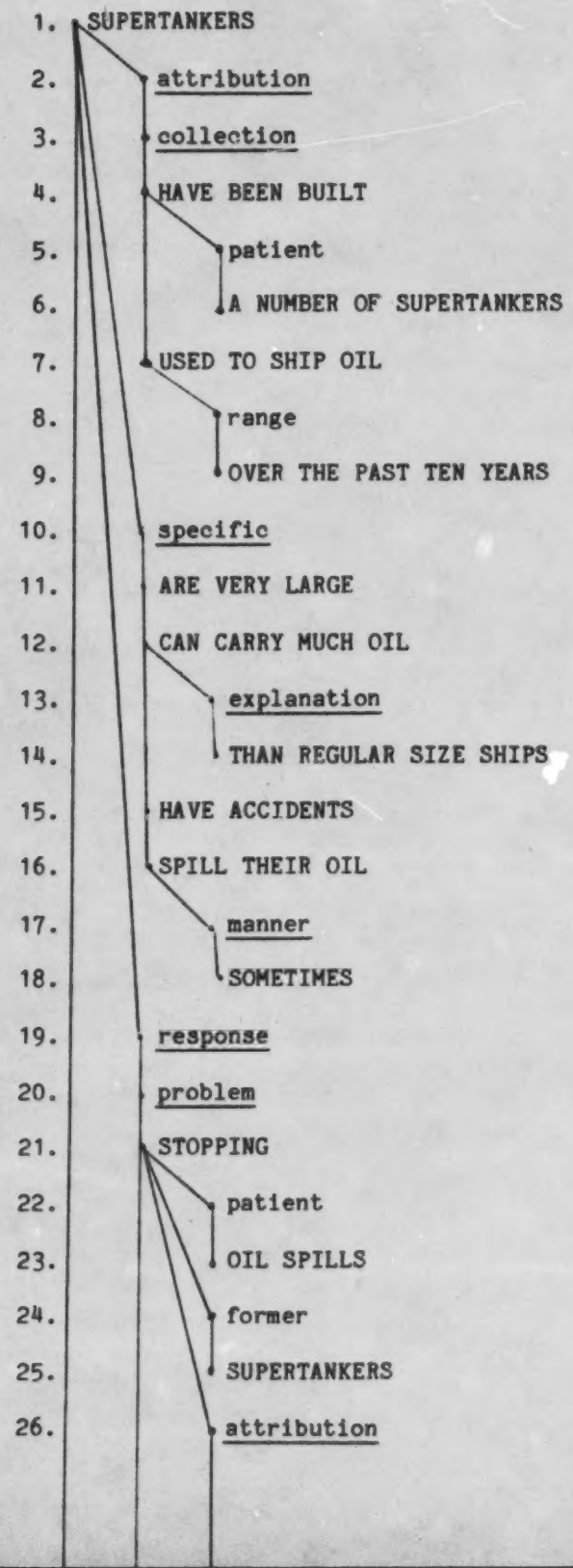
Having explored the implications suggested by our negative results, we turn now to consideration of the more positive results of the study—the results obtained with the low ability students who received the elaborated version of the passage along with the detailed directions and signaling. As already noted, the low ability students who received this treatment combination outperformed other low ability students and approached the

performance of high ability students on both the measure of the number of propositions recalled and the measure of following the author's organization. Specifically, 80% of these low ability students, 84% of the high ability students, and only 35% of the other low ability students followed the author's organization, and these low ability students recalled 87% as many propositions as the high ability students, whereas the other low ability students recalled only 76% as many propositions as the high ability students.

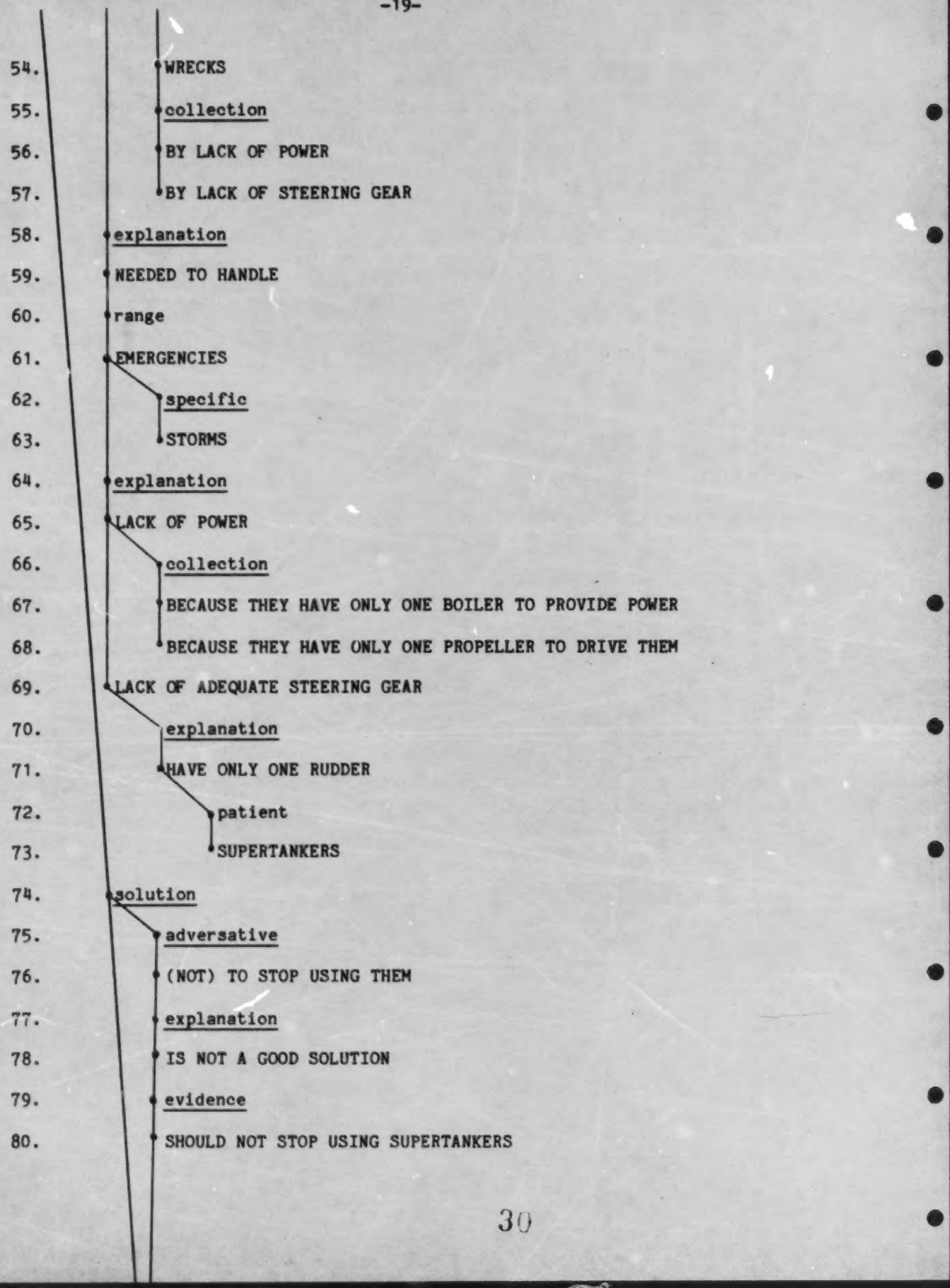
We don't know why the combination of elaboration, directions, and signaling worked better with these lower ability students than with higher ability ones. Moreover, we would want to replicate these results to determine that they are reliable. Also, as we mentioned earlier, the "low ability" students in the present study probably would be considered average students in most schools. Nevertheless, we are encouraged by the results with these lower ability students, and we believe that we have identified some changes to our methods that can make the use of elaboration, signaling, and directions for reading more effective with all ability students.

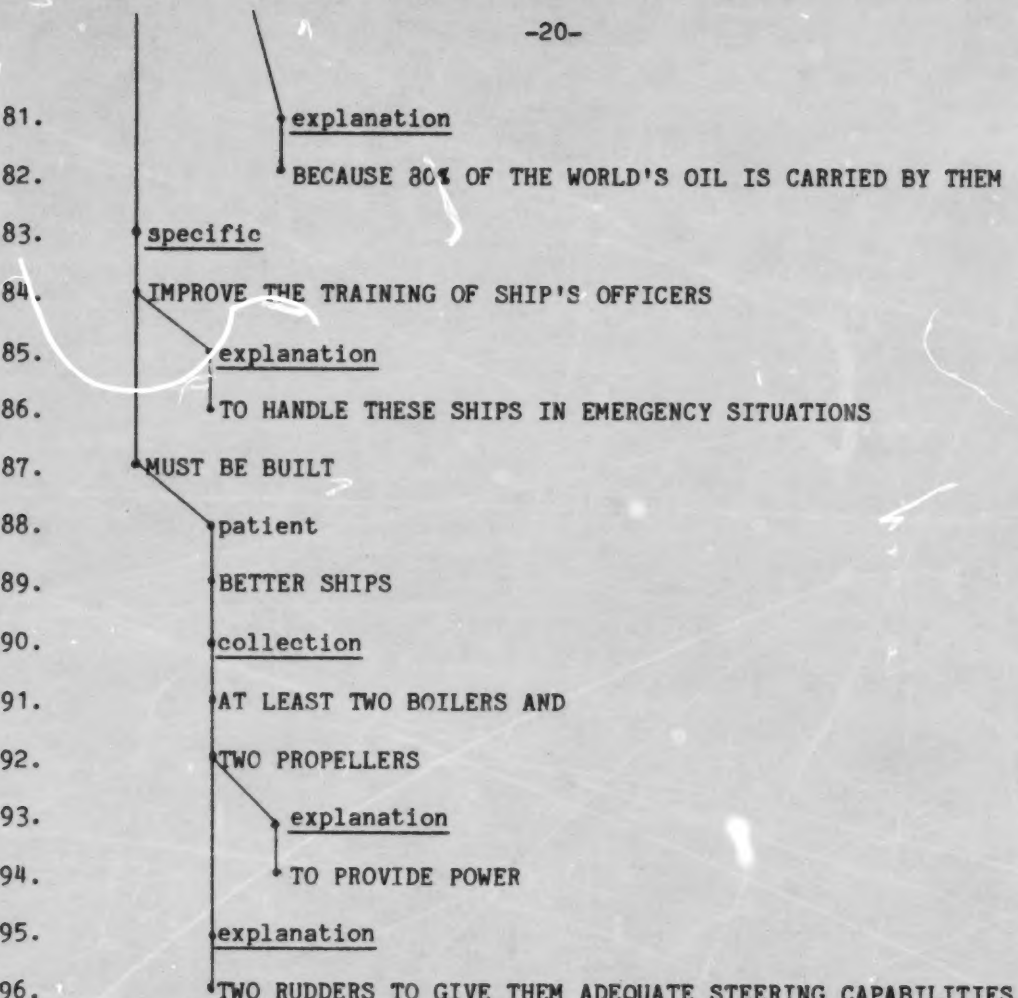
We have repeatedly learned from our experiences working with older youngsters that influencing their learning from text is a real challenge. But we accept that challenge. And we are confident that with knowledge accumulated from theory and experimentation which consider factors beyond the sentence we can continue to identify features of text that facilitate learning and recall.

APPENDIX A
Content Structure for the Elaborated Version
of the Supertanker Passage



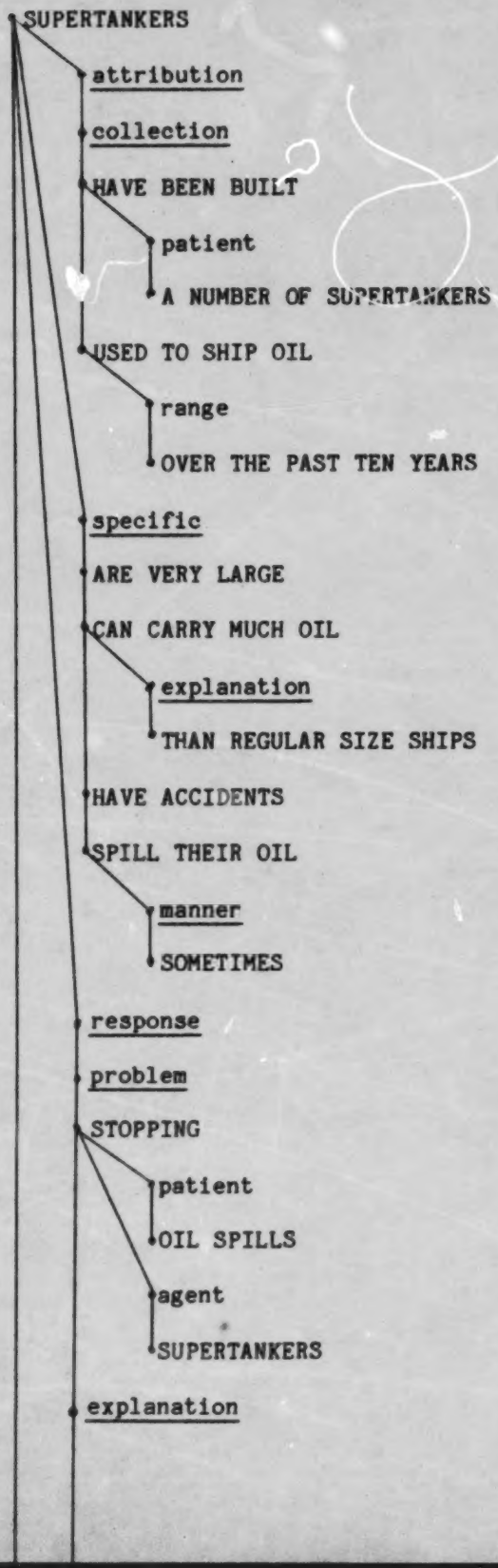
27. collection
28. CARRIES A HALF-MILLION TONS OF OIL
29. IS AS LONG AS FIVE FOOTBALL FIELDS
30. agent
31. THE USUAL SUPERTANKER
32. KILLS
33. specific
34. collection
35. FISH
36. BIRDS
37. PLANT LIFE
38. KILLED ALL THE SALMON IN A 30 MILE AREA
39. agent
40. A RECENT WRECK OFF ALASKA
41. SANK OFF THE COAST OF ENGLAND
42. agent
43. A TANKER
44. DIED
45. agent
46. 200,000 SEAGULLS
47. KILLED OFF ALL THE SEAWEED
48. setting time
49. FOR A PERIOD OF THREE YEARS
50. agent
51. AN OIL SPILL OFF THE CALIFORNIA COAST
52. ARE CAUSED
53. patient


54. WRECKS
55. collection
56. BY LACK OF POWER
57. BY LACK OF STEERING GEAR
58. explanation
59. NEEDED TO HANDLE
60. range
61. EMERGENCIES
62. specific
63. STORMS
64. explanation
65. LACK OF POWER
66. collection
67. BECAUSE THEY HAVE ONLY ONE BOILER TO PROVIDE POWER
68. BECAUSE THEY HAVE ONLY ONE PROPELLER TO DRIVE THEM
69. LACK OF ADEQUATE STEERING GEAR
70. explanation
71. HAVE ONLY ONE RUDDER
72. patient
73. SUPERTANKERS
74. solution
75. adversative
76. (NOT) TO STOP USING THEM
77. explanation
78. IS NOT A GOOD SOLUTION
79. evidence
80. SHOULD NOT STOP USING SUPERTANKERS

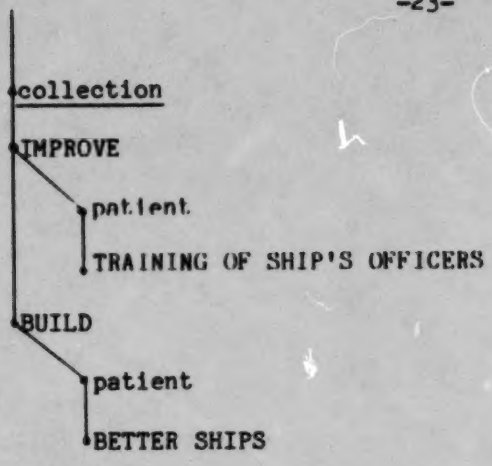


[1] The authors wish to thank Bonnie Meyer for her help with the content structure.

Content Structure for the Unelaborated Version of the Supertanker Passage



27. specific
28. covariance, antecedent
29. KILLS
30. force
31. OIL
32. patient
33. collection
34. covariance, consequence
35. FISH
36. BIRDS
37. PLANT LIFE
38. ARE CAUSED
39. patient
40. WRECKS
41. collection
42. BY LACK OF POWER
43. BY LACK OF STEERING GEAR
44. explanation
45. NEEDED TO HANDLE
46. range
47. EMERGENCIES
48. specific
49. SUCH AS STORMS
50. solution
51. adversative
52. (NOT) TO STOP USING THEM
53. explanation
54. IS NOT A GOOD SOLUTION



[1] The authors wish to thank Bonnie Meyer for her help with the content structure.

References

Ball, J.A. (Ed.). Supertankers. Read: The Magazine for Reading and English, 1975, 24 (12), 2-4.

Craik, F.I.M., & Lockhart, R.S. Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 671-684.

Craik, F.I.M., & Tulving, E. Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology: General, 1975, 104, 3, 268-294.

Dale, E., & Chall, J.S. A formula for predicting readability. Columbus: Ohio State University, 1948.

Fredericksen, C.H. Representing logical and semantic structure of knowledge acquired from discourse. Cognitive Psychology, 1975, 7, 371-458.

Grimes, J.E. The thread of discourse. Amsterdam: North-Holland Publishing Co., 1975.

Kintsch, W. The representation of meaning in memory. New York: Lawrence Erlbaum Associates, 1974.

Marshall, N. The structure of semantic memory for texts. Unpublished doctoral dissertation, Cornell University, 1976.

Meyer, B.J.F. The organization of prose and its effect on memory. Amsterdam: North-Holland Publishing Company, 1975.

Meyer, B.J.F., Brandt, D.M., & Bluth, G.J. Use of top-level structure in text: Key for reading comprehension of ninth-grade students. Reading Research Quarterly, 1980, 16, 72-103.

Palmer, R.J., Slater, W.H., & Graves, M.F. The effect of passage difficulty on good and poor readers' use of author's schema in written recall protocols. In M.L. Kamil & A.J. Moe (Eds.), Perspectives on reading research and instruction. Washington, D.C.: National Reading Conference, 1980.

Tulving, E., & Thomson, D.M. Encoding specificity and retrieval processes in episodic memory. Psychological Review, 1973, 80, 352-373.

Turner, A., & Greene, E. The construction and use of a propositional text base. Technical Report No. 63, Institute for the Study of Intellectual Behavior, University of Colorado, Boulder, April 1977.

Learning Styles and Content Area Reading Instruction

Richard P. Santeusanio, Ed.D.
Danvers Public Schools and
Salem State College

According to recent surveys and studies (Jackson, 1979; O'Rourke, 1980; Steig, 1980; Welle, 1981), the concept of teaching reading in the content areas is becoming more widely accepted by preservice and inservice middle and secondary school teachers. At the same time, more and more professional references on content area reading are becoming available to teachers. These references offer teachers a myriad of suggestions on how to prepare students for reading assignments, how to help students comprehend their reading assignments, and how to help them remember what they have read (study skills).

Preparation for Reading

Among the techniques suggested for preparing students for reading assignments are vocabulary instruction, structured overviews, advanced organizers, chapter previews, and instructional objectives. Each of these techniques has its proponents.

Some educators cite the research of Davis (1968) and Spearitt (1972) to justify the practice of pre-teaching vocabulary. Barron (1979) and Earle (1969) encourage teachers to use structured overviews. Ausubel (1960, 1963, 1978) has discussed and researched advanced organizers for over twenty years. Howards (1980) and Santeusanio (in press) favor chapter previews and Rothkopf (1980) believes teachers should share instructional objectives with their students.

Comprehension of Reading

A number of approaches to teaching reading comprehension in the content areas has been suggested. Herber (1978) is often associated with the practice of using reading/study guides. Among those who support using adjunct questions are Rothkopf (1980) and Reynolds and Anderson (1980), while Becker and Englemann (1977) and Carnine and Silbert (1979) endorse the direct instruction model. Manzo (1969, 1975) has developed and tested two unique techniques, the ReQuest Procedure and the Guided Reading Procedure.

Retention of Reading

The professional literature contains descriptions of many study approaches designed to help students retain what they read, at least long enough to pass tests. The most widely cited approach is Robinson's (1970) SQ3R method. Other suggested study methods include note-taking systems like Pauk's (1974) Cornell Method and Hanf's (1971) mapping technique. Baker (1979) recommends that teachers help their students to monitor their comprehension and Allen (1971) and Osterhouse (1972) feel some students will retain information and perform well on tests if they reduce their test anxiety through participation in desensitization programs. Devine (1981) is an educator who has devoted an entire textbook to the topic of study skills.

What to Teach?

Given the wide variety of approaches available to teachers for assisting their students before, during, and after their reading, which ones should teachers use? If teachers look to research for an answer, they will be disappointed. For despite the comprehensive research reviews (Anderson and Armbruster, 1980; Barnes and Clawson, 1975; Grant, 1978; Hartley and

Davies, 1976; Johns and McNamara, 1980; Smith, 1978; Tierney and Cunningham, 1980) that have been completed on some of these techniques, there is simply not enough evidence to demonstrate that any of the techniques should be used all or most of the time with all or most students.

What naturally happens, then, is that content teachers and reading specialists use the techniques that suit their own teaching style. But what about the learning styles of the students? Are their learning styles compatible with their instructors' teaching styles? When the two are compatible, student achievement can improve significantly (Domino, 1970; Farr, 1971; Rodriguez, 1978; Santeusanio, 1972). When the two are not compatible, a problem exists.

A Possible Solution

Content area teachers and reading specialists can begin to solve the problem by becoming familiar with the concept of learning style. Learning style consists of ". . . distinctive behaviors which serve as indicators of how a person learns from and adapts to his environment. It also gives clues as to how a person's mind operates" (Gregorc, 1979, p. 234).

Among the learning style inventories that are available are the Learning Style Inventory (Dunn and Dunn, 1975), Learning Styles Inventory: A Measure of Student Preference for Instructional Technique (Renzulli and Smith, 1978) and the Transaction Ability Inventory (Gregorc, 1982). The Learning Style Inventory identifies learning preferences of students relative to environmental elements (sound, light, temperature, and design), emotional elements (motivation, persistence, responsibility, need for structure), sociological elements (preference for working alone, in small groups, with a few friends, with an adult, or some such combination), and physical elements such as perceptual strengths, intake, time, and mobility.

Renzulli and Smith's Learning Styles Inventory: A Measure of Student Preference for Instructional Techniques is designed to measure student preferences for instructional modes such as projects, drills and recitation, peer teaching, discussion, teaching games, independent study, programmed instruction, lecture, and simulation. Gregorc's (1982) self-analysis tool, the Transaction Ability Inventory, helps individuals to recognize and identify their most efficient channels through which they perceive and express information. They find out their natural perceptions tend to lean more towards the abstract or the concrete and their innate ordering qualities tend to be either linear (sequence) or nonlinear (random).

Teachers armed with information gained from administering a learning style inventory should be in a position of matching or adapting their teaching styles with their students' learning styles. Here are some possible matches (Santeusanio, in press).

Student Learning Style	Teaching Style/Instructional Technique
Lecture	Teacher-prepared structured overview
Independent study	Student-prepared structured overview
Small group discussion	Small group discussion of reading/study guide
Independent study	Individual response to adjunct questions
Little need for structure	Mapping note-taking system
Strong need for structure	Traditional note-taking system
Study with an adult	ReQuest Procedure
Teaching games	Vocabulary reinforcement games
Drills and recitation	Direct Teaching Model

Currently, no research has been completed to support these suggested matches of learning style and teaching styles relative to content area reading instruction. Such research could contribute greatly to the improvement of teaching reading in the content areas. In the meantime, a point made by Dunn and her colleagues (1981) is well taken: "We can no longer assume that all students will learn through whichever strategy the teacher prefers to use" (p. 372).

References

Allen, G.J. Effectiveness of study counseling and desensitization in alleviating test anxiety in college students. Journal of Abnormal Psychology, 1971, 77, 282-289.

Anderson, T.H. & Armbruster, B.B. Reading and text -- Studying strategies. Paper presented at Conference on Reading Expository Text, University of Wisconsin - Madison, November, 1980.

Ausubel, D.P. In defense of advance organizers: A reply to the critics. Review of Educational Research, 1978, 48, 251-257.

Ausubel, D.P. The psychology of meaningful verbal learning. New York: Grune and Stratton, 1963.

Ausubel, D.P. The use of advanced organizers in learning and retention of meaningful verbal material. Journal of Educational Psychology, 1960, 51, 267-272.

Baker, L. Do I understand or do I not understand: That is the question. (Reading Education Report No. 10). Champaign, Illinois: Center for the Study of Reading, 1979.

Barnes, B.R. & Clawson, E.M. Do advanced organizers facilitate learning? Recommendations for further research based on an analysis of 32 studies. Review of Educational Research, 1975, 45, 637-659.

Barron, R.F. Research for the classroom teacher: Recent developments on the structured overview as an advanced organizer. In H.L. Herber & J.D. Riley (Eds.), Research in Reading in the Content Areas, The Fourth Report. Syracuse, New York: Reading and Language Arts Center, Syracuse University, 1979.

Becker, W.C. and Englemann, S. The Oregon direct instruction model. Eugene, Oregon: University of Oregon Follow-Through Project, 1977.

Carnine, D. & Silbert, J. Direct Instruction Reading. Columbus, Ohio: Charles E. Merrill, 1979.

Davis, F.B. Research on comprehension in reading. Reading Research Quarterly, 1968, 3, 628-678.

Devine, T. Teaching Study Skills - A Guide for Teachers. Boston: Allyn and Bacon, 1981.

Dommino, G. Interactive effects of achievement motivation and teaching style on academic achievement. ACT Research Report, 1970, 39, 1-9.

Dunn, R., DeBello, T., Brennan, P., Krimsky, J. & Murrain, P. Learning style researchers define difference differently. Educational Leadership, 1981, 38, 372-375.

Dunn, R.S., Dunn K.J. & Price, G.E. Learning Style Inventory. Lawrence, Kansas: Price Systems, 1975.

Earl, R.E. Use of structured overviews in mathematics classes. In H.L. Herber & P. Sanders (Eds.), Research in Reading in the Content Areas, First Year Report. Syracuse, New York: Reading and Language Arts Center, Syracuse University, 1969.

Farr, B.J. Individual differences in learning: Predicting one's more effective learning modality. Ann Arbor, Michigan: University Microfilms, July, 1971, 1332a.

Gregorc, A.F. Transaction Ability Inventory. Columbia, Connecticut: Gregorc Associates, Inc., 1982.

Grant, J. Study guides as aids to learning: A review of research. In J.L. Vaughan, Jr. & P.J. Gaus (Eds.), Research on Reading in Secondary Schools, Third Monograph. Tucson, Arizona: University of Arizona, 1979.

Hanf, M. B. Mapping: A technique for translating reading into thinking. Journal of Reading, 1971, 14, 225-230, 270.

Hartley, J. & Davies, I.K. Preinstructional strategies: The role of pretests, behavioral objectives, overviews and advanced organizers. Review of Educational Research, 1976, 46, 239-265.

Herber, H.L. Teaching reading in content areas, (2nd ed.). Englewood Cliffs, New Jersey: Prentice-Hall, 1978.

Howards, M. Reading diagnosis and instruction, an integrated approach. Reston, Virginia: Reston Publishing Company, 1980.

Jackson, J.E. Reading in the secondary school: A survey of teachers. Journal of Reading, 1979, 23, 229-232.

Johns, J.L. & McNamara, L.P. The SQ3R study technique: A forgotten research topic. Journal of Reading, 1980, 23, 705-708.

Manzo, A. The ReQuest procedure. Journal of Reading, 1969, 11, 123-126.

O'Rourke, W.J. Research on the attitude of secondary teachers towards teaching reading in content classes. Journal of Reading, 1980, 23, 337-339.

Osterhouse, R.A. Desensitization and study skills training as treatment for two types of test-anxious students. Journal of Counseling Psychology, 1972, 19, 301-307.

Pauk, W. How to Study in College, (2nd ed.). Boston: Houghton-Mifflin Publishing Company, 1974.

Renzulli, J.S. & Smith, L.H. Learning styles inventory: A measure of student preference for instructional techniques. Mansfield Center, Connecticut: Creative Learning Press, Inc., 1978.

Reynolds, R.E. & Anderson, R.C. Influence of questions on the allocation of attention during reading (Tech. Rep. 183). Champaign, Illinois: Center for the Study of Reading, 1980.

Robinson, F.P. Effective study, (4th ed.). New York: Harper and Row, 1970.

Rodriguez, J.H. Abstract of trait-treatment interaction research: A valuable source for individualizing reading instruction. Reading World, 1978, 18, 148-155.

Rothkopf, E.Z. Adjunct aids, and the control of mathemagenic activities during purposive reading. Paper presented at a Conference of Reading Expository Text, The University of Wisconsin, Madison, 1980.

Santeusanio, R.P. Content area reading: A practical approach. Reading, Mass.: Addison-Wesley Publishing Company, in press.

Smith, A.L. The structured overview: A prereading strategy. In J.L. Vaughan,, Jr. & P.J. Gaus (Eds.), Research on Reading in Secondary Schools (Second Monograph). Tucson, Arizona: University of Arizona, 1978.

Spearitt, D. Identification of subskills of reading comprehension by maximum likelihood factor analysis. Reading Research Quarterly, 1972, 8, 92-111.

Steig, J. Attitudes of pre-service secondary teachers towards reading in the content areas. In J.L. Vaughan, Jr. & P.L. Anders (Eds.), Research on Reading in the Secondary Schools (Fifth Monograph). Tucson, Arizona: University of Arizona, 1980.

Tierney, R.J. & Cunningham, J.W. Research on teaching reading comprehension (Tech. Rep. 187). Champaign, Illinois: Center for the Study of Reading, 1980.

Welle, D.W. Effects of a required reading methods course on attitudes of secondary education majors - A three year study." Journal of Reading, 1981, 25, 134-136.

Secondary Reading Applications of the Research Base

John J. Carney
University of New Hampshire

Events of the past decade, most notably the erosion of Scholastic Aptitude Test scores and litigation on behalf of high school graduates alleging inadequate training by the schools (for example, Peter Doe v. San Francisco Unified School District, et al.), have focused attention on the status of reading instruction in the secondary school. Attention to these concerns is found in the emergence of a nationwide movement whose various manifestations are described by terms such as "back to basics," "minimum competency standards," and "competency-based instruction." Whatever the descriptors used, it is evident that reading in the secondary school has become both a significant social and educational issue.

The Research Base

An analysis of the research base 1960-1980 in secondary reading reflects clearly an emphasis upon the acquisition of information from the medium of print. This focus on comprehension may be seen to have its roots in the thinking of Bruner (1960, 1966) on the importance of structure for learning and its relationship to the learner:

> Grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn structure, in short, is to learn how things are related. (1960, p. 7)

> Since the merit of a structure depends upon its power for simplifying information, for generating new propositions, and for increasing the manipulability of a body of knowledge, structure must always be related to the status and gifts of the learner. Viewed in this way, the optimal structure of a body of knowledge is not absolute but relative. (1966, p. 41)

In addition, Ausubel's (1963) examination of the influence of cognitive structure variables on meaningful verbal learning has had a significant impact on studies of reading comprehension:

> Cognitive structure is . . . the most significant Independent variable influencing (facilitating, inhibiting, limiting) the learner's capacity for acquiring more new knowledge in the same field. (p. 27)
>
> School learning requires the incorporation of new concepts and information into an existing and established cognitive framework with particular organizational properties. (pp.28-29)

And Rothkopf's (1965) concept of mathemagenic behaviors, i.e., those activities in which a reader engages when interacting with print that determine what will be learned, has generated studies in two related areas:

> The most interesting feature of the conceptual model is the notion of mathemagenic behavior. It divides the domain of written instruction into two related classes of problems. The first of these is how the instructive material must be arranged to produce efficient learning. The second problem concerns itself with mathemagenic behavior, i.e., what must be done to assure that the content of an instructive document is effectively used. (p. 216)

More recent work (Rumelhart, 1977, Anderson, Spiro and Anderson, 1977) has focused specifically upon the notion of comprehension as an interactive process. As Tuinman (1980) indicates:

> Two popular concepts dominate current thinking about reading comprehension: the idea that comprehension is an active, constructive intellectual process and that it involves the use of schemas in understanding, storing and retrieving what is read. (p. 414)

Hansen and Hubbard (1980) define a schema as an individual's dynamic mental structure which suggests relationships between existing knowledge and new information.

The common thread of structure--the cognitive structure of the individual, the structure of written materials, the interaction between individual and materials--undergirds the present concern with instructional

techniques for teaching individuals to acquire meaning from connected discourse. In addition, the development of an approach to reading instruction which is based on the integration of reading behaviors and academic content in secondary school content classes has paralleled this research on the acquisition of information from text. This approach, often called "reading in the content areas," has provided a framework within which research on how readers learn from text and how they can be assisted to do so has important applications for meeting the cognitive goals of secondary schooling.

What, then, are some of the practical implications for secondary reading of the research base?

Vocabulary and Concept Development

Studies (Davis, 1968, 1972; Spearitt, 1972, Thorndike, 1973-74) which have sought to identify factors requisite to reading comprehension have found consistently a component identified as "word meaning" or "word knowledge."

The role of word knowledge in an interactive process of comprehension is expressed by Strange (1980), "Schema theory suggests that vocabulary instruction should be given greater emphasis than it currently is. If words are labels for schemata, then the more words a child has, the more precise she/he can become in selecting appropriate schemata." (p. 394) And Goodman (1976) portrays vocabulary as ". . . the ability of the child to sort out his experiences and concepts in relation to words and phrases in the context of what he is reading." (p. 480)

Because knowledge of word meanings is fundamental to the process of understanding and highly predictive of the individual's ability to comprehend discourse (Anderson and Freebody, 1979), it is important that students

be taught the meanings of individual words and techniques for acquiring the meanings of unknown words. Further, it is necessary that words be portrayed as interdependent elements whose meanings are determined by their functions in groups of words (phrases, clauses, sentences, and larger meaningful units).

Modeling Word Meaning Strategies

An approach which offers great promise for assisting learners to deal with the demands of vocabulary acquisition is the technique of modeling. Modeling provides students with a process for applying strategies designed to elicit meaning from unknown terms encountered in reading. The essence of such an approach might be described by the phrase "understanding by doing." It is imperative that the learner not only be taught strategies for acquiring meaning, but that he/she understands how and why such strategies are to be used. Further, as Brown (1977) suggests in her discussion of metacognition, the training of skills in a meaningful context may be highly beneficial. (p. 96)

The following sentence illustrates some of the word meaning techniques that might be modeled for students:

> As the archaelogist dug deeper into the subsoil,
> he located more artifacts, such as pieces of broken
> pottery and simple stone tools.

To gain meaning from the sentence, it is important for students to be able to apply word meaning behaviors such as contextual analysis, use of the dictionary as a source of word meaning, and structural analysis. In this sentence it is quite possible that the word "archaeologist" will require use of the dictionary, although the tenor of the entire sentence provides some general contextual clues as might a knowledge of the structural compo-

nents archaeo-and-logy. "Subsoil" may be defined from the context of "dug deeper" and/or from a knowledge of the structural elements sub-and-soil. A series of contextual examples (pieces of broken pottery, simple stone tools) provide meaning for the term "artifacts."

The role of the teacher is to model the application of such word meaning skills through examples selected from the content.

Here is an example of a teacher using an excerpt from Robinson Crusoe, an assigned reading, to model the technique of contextual analysis:

PART I

Look at the words below. Put an x in front of those that are familiar. Then, for each word, underline a definition. Do this even if you don't know the word and have to guess.

_____adversary: a) friend; b) opponent; c) wild animal; d) adviser
_____mendicants: a) mechanics; b) citizens; c) medicine men; d) beggars
_____gaskin: a) hind leg; b) gaslight; c) rope; d) stopper

PART II

Read the following paragraphs in which the words above are used. When you finish, go back to PART I and change any answers you wish.

> Instantly the figure reappeared, and, making a wide circuit, began to head me off. I could see that it was useless for me to try to outdistance such an adversary. I stood still, therefore, and cast about for some method of escape; and as I was so thinking, the recollection of my pistol flashed into my mind. . .
>
> Of all the mendicants that I had seen or fancied, he was the chief for raggedness. The patchwork of his tattered clothing was held together by the most various and singular fastenings: brass buttons, bits of stick, and loops of tarry gaskin. . .

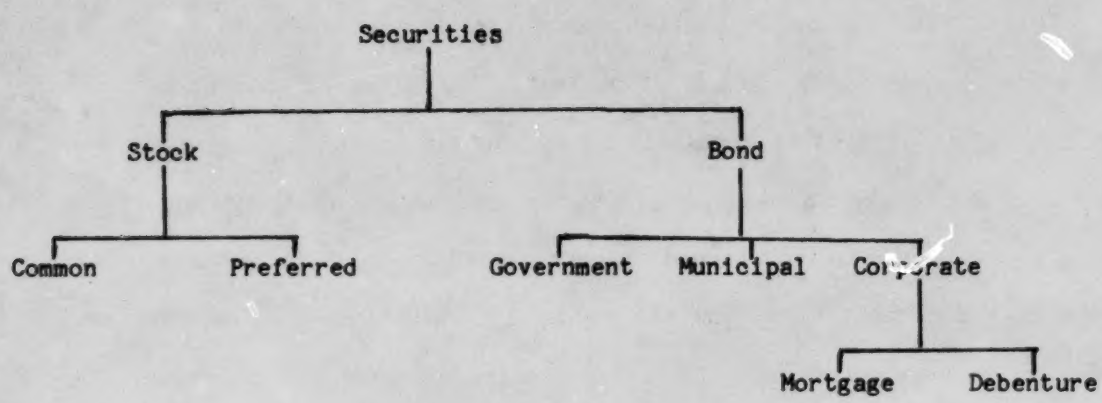
PART III

Here are the correct answers (give to students). Often you can figure out a meaning of an unfamiliar word from the other words used with it. Getting meaning from an unknown word's surroundings is called using context. Let us discuss how you arrived at the meanings of the words in PART I.

This discussion or verbalization of the process is critical if students are to understand the use of context. For example, the definition of "adversary" is arrived at cumulatively by putting together bits of information such as "began to head me off," "some method of escape," and finally the information in the second paragraph that this "adversary" wears clothing. Together, they lead the reader to an inference that "adversary" means an opponent, a threat. In this case the adversary is a person. This thinking process should be articulated for the students.

The Structured Overview

Another activity which provides both direct instructional exposure to vocabulary and models the "structure of content" is the graphic organizer or structured overview. Barron (1969) describes the underlying philosophy of the structured overview in this way: ". . . the vocabulary of content subjects can be introduced in such a way that the words assume the form of 'advance organizers' and provide the students with cues to the 'structure' of subjects." (p. 29) In effect, the key vocabulary terms representing the important concepts contained in the content are identified, organized in a graphic display which presents relationships among the terms in a hierarchical fashion and presented to the students prior to their reading of a chapter or unit of material. The graphic display typically uses vertical and horizontal dimensions to portray ideas of differing and/or similar levels of abstraction. Here, for example, is a structured overview of a section from an economics textbook dealing with securities.



(developed by Richard Kerper)

Students are introduced to the overview by the teacher, who discusses the ideas or concepts represented by the terms and their relationships. The overview serves as a kind of cognitive blueprint or framework which students will be able to use to guide their reading.

Students should be encouraged to use the structured overview during reading to see how key technical terms and the concepts they represent fit into the larger conceptual framework or network of ideas contained in the textual material.

After modeling and presenting vocabulary through the techniques described, it is the teacher's role to identify and locate for students words in the body of the material whose meanings can be derived by applying the strategies modeled. Students are then asked to read the text, applying the appropriate word meaning strategies to the words indicated by the teacher. In order to monitor this process, it is advisable for the teacher to elicit written or verbal meanings for the words until students demonstrate that the strategy is being internalized.

Analogies and Categorizing

Manipulating terms within the framework of higher level thinking strategies has substantial potential for helping learners acquire word meanings and their underlying concepts. Two strategies are described here: the use of analogies and classification/categorization.

A basic attribute of analogies is that they express relationships or correspondences between sets of terms. Analogies can be constructed to reflect a wide range of relationships: cause/effect, part/whole or whole/part, synonym/antonym, action/object or object/action, degree, sequence, association. In the process of learning terms representing unfamiliar concepts, analogies may be used by pairing sets of known terms (known implying both the meanings of words and their relationship) with the terms representing new and unfamiliar ideas. This enables the learner to tie new learning to an already existing knowledge or conceptual base. For example, the difficult terms staminate and pistillate acquire meaning in the following analogy:

male : female : : staminate : pistillate

A practical application of the use of analogies to promote understanding is Senoff's (1976) application to science misnomers, in which he tests students' powers of discrimination with relationships such as:

North star : star : : evening star : planet

varicose vein : vein : : pulmonary vein : artery

A second type of approach that combines word meanings and higher level cognitive abilities is classification or categorization. Gerhard (1975) suggests that a category is made up of a group of items with a common characteristic and a label used to describe what they have in common. (p. 149) To illustrate, here is an excerpt from Thurber's (1957) The Wonderful O:

> Hyde was suddenly up to his ankles in phantasmagoria. "Crabs, crayfish, prawns, shrimps," he howled, "alias the decapods. Centipedes and spiders, alias the arthropods"... He turned and ran, pursued by rodents small and big, the rat, the rabbit, and the guinea pig. (p.67)

Categorizing provides the learner with the opportunity to perceive relationships among concepts represented by terms and to identify the nature of such relationships. Herber (1970) suggests a type of exercise in which the student is asked to respond to a series of terms by extracting the unrelated term and specifying the relationship that exists among the remaining terms. Here are some examples:

salt	short story
air	novel
water	sonnet
sugar	essay
compounds	prose

The process can be made more complex by increasing the possible sets of relationships in each group of words:

Answer the following questions about this group of terms:

1. platypus 2. robin 3. frog

a. In what two ways can all three terms be categorized:

egg layers vertebrates

b. How can 1 and 2 be categorized but not 3? warmblooded

c. How can 2 and 3 be categorized but not 1? not mammals

Summary

The strategies outlined above are designed to enhance the acquisition of ideas by helping the learner broaden his/her conceptual base. While understanding the meanings of words does not imply total comprehension of extended discourse, it is clear that teaching students techniques that will help them internalize words in their reading that convey concepts is a profitable educational undertaking. Learning words and their underlying concepts is a fundamental step in the process of understanding.

Comprehension: An Overview

Wiener and Cromer (1967), in their conceptual analysis of reading and reading and difficulties, posit a "difference" model of reading difficulty which is defined as ". . . a mismatch between the material being read and the response patterns of the reader." (p. 630) They also suggest that there are basic differences between the response patterns of good and poor readers.

Much of the recent research in comprehension has focused on the examination and identification of reading comprehension processes in good and poor readers. In a comprehensive review of this research, Golinkoff (1975-76) concludes that good and poor readers differ primarily in the areas of decoding and text organization processes or obtaining meaning from larger stretches of text. She concludes by placing the status of current research in perspective:

> Clearly, reading comprehension requires an active attentive, and selective reader who, to some extent, operates independently of text to extract meaning from it. Inadequate reading comprehension seems to imply being somewhat of a slave to the actual printed word. It also implies a failure to extract structure and organization from text. Hopefully, future work in this area will specify the nature of the interaction between components of the reading comprehension process, thereby providing a sound theoretical and empirical base for remediation efforts. (p. 653)

Interestingly, none of the eighteen studies reviewed by Golinkoff used subjects at the secondary level (grades 7-12). This is true also of more recent studies of good and poor readers (Rickards and Hatcher, 1977-78; Eamon, 1978-79; Tierney, Bridge, and Cera, 1978-79; Taylor, 1980).

A limited number of studies have compared good and poor readers at the secondary level. Peters (1975-76), using the Frayer model, a technique for structuring material to define concepts, found that both good and poor readers had a higher degree of comprehension than comparable good and poor readers who used a textbook approach. Peters concludes that learning is facilitated by the imposition of structural order upon material. Examining the strategies used by good and poor readers, Olshavsky (1976-77) determined that good readers, while not using strategies different from those of poor readers, used strategies more frequently, particularly use of context to define a word and the addition of information. Andre and Anderson (1978-79) found that student generation of questions during reading had a facilitative effect on comprehension and was more effective for students of low verbal ability than for students of higher verbal ability.

Findings from the research base suggest the potential importance of the following variables as critical factors for instruction: (1) the identification and use of appropriate strategies for acquiring meaning from text, and (2) manipulation of the structure of text to enhance comprehension.

Strategies for Meaningful Reading

A critical dimension in the understanding of meaningful materials is the ability of the learner to apply comprehension strategies that will permit him/her to derive meaning from what is read. A frequent approach to improving students' comprehension has been to focus on the development of questioning strategies, both those of teachers and of learners [see, for

example, Guszak (1969) and Andre and Anderson (1978-79)]. A second area, to be discussed here, is the process of teaching learners strategies which can be applied to content to facilitate understanding. Two techniques will be described here: a strategy for assisting the reader to derive intratextual relationships or ideas which exist implicitly in text; the use of "embedded organizers," adjunct aids designed to focus attention on critical points in the text and to promote meaningful interaction with these ideas.

Deriving Intratextual Relationships

The following simple experiment illustrates the process of deriving an implicit idea by relating specific pieces of information. If a child is given three pictures--a person running toward a fire alarm box on a telephone pole, a fire engine leaving the fire station with its lights flashing, a picture of the fire engine with its hoses attached to a hydrant--and is asked, "What is happening?", the response in an overwhelming number of cases is, "There is a fire." (Interestingly, when this task has been performed in an inner city, an alternative response has been "false alarm," certainly an example of relating information to one's own schemata). The individual has arrived at an idea which, in effect, exists in the intersection of the explicit information available.

Deriving such implicit ideas from written materials is a behavior pertinent to an understanding of both literary and expository materials. The following simple selection will be used to model this process.

> In most parts of the world, early people used stone, which was readily available, for their tools. In some places they found other suitable materials. They could use ivory where there were animals with tusks. If they lived near the sea, they could use shells.

Figure 1 is designed to portray for the student the process of relating information to determine implicit ideas. Each of the circles represents one of the pieces of specific information from the selection above. The shaded area of intersection represents an idea whose source lies in the reader's ability to relate the information given.

Insert Figure 1 about here

After being exposed to the model and a verbal explanation, the student might be asked to select an implicit idea from several possible choices, such as

_____early people were backward because they lacked tools

_____early people used their environment (surroundings) to supply their needs

_____toolmaking was possible only when stone was available

The goals of this entire process is to provide the student with a visual model which can be internalized and applied independently to the reading of text. This technique represents one effort to facilitate comprehension by explaining to the learner the "how" of approaching text.

Carney (1973) has developed a strategy designed to activate meaningful models of desirable responses to what has been read at significant points within the material. These models, called here embedded organizers, act as stimuli for arousing the reader's interest and focusing attention upon the critical dimensions of the content to be learned. In order to assist the reader to formulate his/her thinking, he/she is directed to respond to the content and the model by writing a response in the blank following the embedded organizer.

The following is an excerpt from the selection "Pressures for Independence" in Colonial Kenya: Cultures in Conflict, which has been modified to include embedded organizers.

> THE SETTLERS, through their Kenya Electors Union, countered with a demand for the deportation of Kenyatta. The blamed him for instituting strikes and inciting rebellion. British colonial officials responded instead with attempts to meet some of the African demands.
> **(Finally! This suggests a real change in attitude on the part of the colonial officials.)**
> (
>
>)
>
> Months, then years, were devoted to debate and bargaining over proposed constitutional changes. But when they were announced early in 1952 they added up only to changes in the Legislative Council:
> 30,000 Europeans were to have 14 elected members;
> 90,000 Indians were to have 6 elected members;
> 24,000 Arabs were to have 1 elected member;
> 5,000,000 Africans were to have 5 appointed members.
>
> (Not so much of a change after all--almost no action taken. Note carefully numbers of representatives for each group and how Africans' representatives are selected.)
> (
>
>)

This procedure is designed specifically to simulate the interactive process between the mature, questioning reader and the material being read. Over time, the written response format and, ultimately, the embedded organizers themselves are phased out as readers begin to internalize the process.

Summary

The strategies presented above are representative of attempts to truly "teach" comprehension by showing students the "how" of meaningful interaction with text. It is suggested that such insight on the part of the learner is likely to facilitate reading for meaning.

Recognizing the Structure of Content

The nature of academic disciplines is such that the written presentation of ideas in textual materials tends to take certain forms and follow certain patterns. Expository materials develop concepts through patterns such as listing of characteristics, cause-effect, comparison of ideas, superordinate and subordinate ideas, and sequence (both logical and chronological). Literary genres such as poetry, drama, and the novel are characterized by specific forms and patterns. Meyer (1977) points out that "the structure of prose has been shown to be a powerful variable in determining recall of prose." (p. 199) Assisting readers to perceive the underlying structure of content, then, has the potential for facilitating the acquisition of ideas from text. Consider the following representative pieces of expository content material:

1. Birds are vertebrates, animals having backbones or spinal columns. Birds are classified as warm-blooded animals, meaning that they have a built-in control that maintains their body temperature at about the same level regardless of the temperature outside the body. Birds, like all mammals, breathe by taking in air from which oxygen is extracted by the lungs.

   Fish belong to the classification called vertebrates, animals with backbones. Fish are considered cold-blooded animals because they do not have an internal temperature control. Their body temperature is affected by how warm or cold the surrounding environment is. The process of respiration in fish occurs when fish extract oxygen from water as it passes over their gills.

2. Both birds and fish belong to the group of animals called vertebrates, meaning animals with backbones. Birds are classified as warm-blooded animals, meaning that they have a built-in control that maintains their body temperature at about the same level regardless of the temperature outside the body. Fish, however, are called cold-blooded because they do not have an internal temperature control. Their body temperature is affected by how warm or cold the surrounding environment is. The process of respiration differs in birds and fish. Birds, like all mammals, breathe by extracting oxygen from the air in the lungs. Fish also extract oxygen, but they take it from water as it passes over their gills.

The first selection considers the topics "Birds" and "Fish" separately. Each section lists several characteristics or attributes based upon body structure or function. The second selection contains the same basic information as the first. However, it has been arranged to focus the reader's attention on significant similarities and differences between birds and fish. The imposition of such structure is designed to promote the acquisition of ideas.

While it may be impractical to rewrite material to provide structure, it is possible to take information and organize it for the student's learning. For example, the teacher may assist the learner to organize information by designing a structure which highlights the organization inherent in the material or imposes organization on poorly or loosely structured material. Figure 2 illustrates such a visual representation of the information contained in the selections above.

Insert Figure 2 about here

Similar techniques may be used to demonstrate other organizational structures. In his book, The Dragons of Eden, for instance, author Carl Sagan presents the fifteen billion year lifetime of the universe through the use of a calendar format representing the span of a single year. Thus, the "Big Bang" occurs on January 1, formation of the earth on September 14, and the appearance of the first humans at approximately 10:30 p.m. on December 31.

Summary

Strategies such as those presented above make it possible for readers to examine the development of ideas and their relationships to each other. The awareness of structure, then, is perceived as a source of meaning.

Secondary Reading 1960-1980: Epilogue

From its origins as simply an extension of the established developmental and remedial reading programs in elementary education, secondary reading has acquired an identity, characterized by an emphasis on the integration of reading and academic content (in addition to developmental and remedial reading programs) and by a research emphasis which seeks to understand how knowledge is acquired through text. The insights which have been gained are likely to have a significant impact on both what is learned through reading and how it is to be learned.

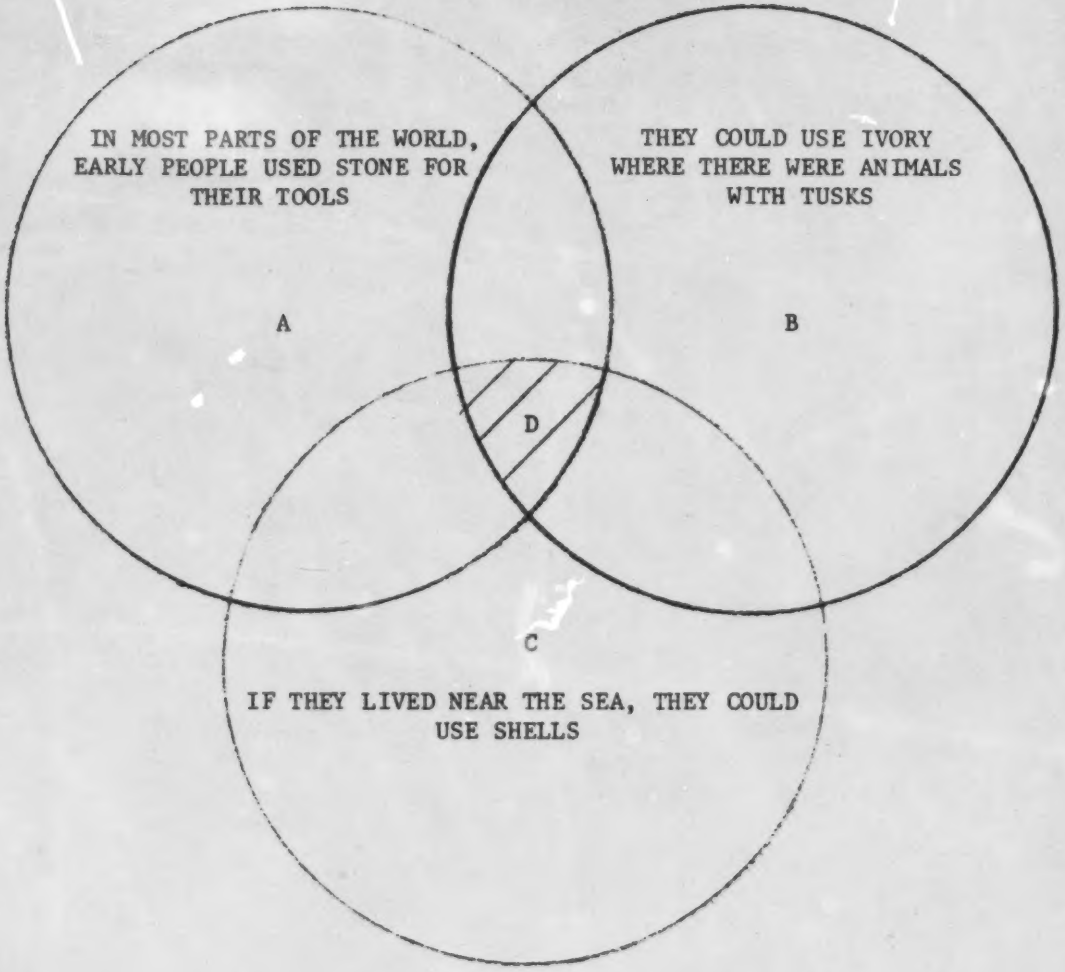

IN MOST PARTS OF THE WORLD, EARLY PEOPLE USED STONE FOR THEIR TOOLS
A
THEY COULD USE IVORY WHERE THERE WERE ANIMALS WITH TUSKS
B
D
C
IF THEY LIVED NEAR THE SEA, THEY COULD USE SHELLS

Figure 1. Model for Intratextual Relationships

Figure 2. Model for Organizational Pattern of Comparison

	BIRDS	FISH
SIMILARITIES	VERTEBRATES	VERTEBRATES
DIFFERENCES	WARM-BLOODED	COLD-BLOODED
DIFFERENCES	BREATHE WITH LUNGS	BREATHE WITH GILLS

References

Anderson, R., & Freebody, P. Vocabulary knowledge and reading. Center for the Study of Reading, Reading Education Report No. 11. University of Illinois at Urbana-Champaign, 1979.

Anderson, R., Spiro, R., & Anderson, M. Schemata as scaffolding for the representation of information in connected discourse (Tech. Rep. 24). Center for the Study of Reading. University of Illinois at Urbana-Champaign, 1977.

Andre, M., & Anderson, T. The development and evaluation of a self-questioning study technique. Reading Research Quarterly, 1978-1979, 14, 605-623.

Ausubel, D. The psychology of meaningful verbal learning. New York: Grune and Stratton, 1963.

Barron, R. The use of vocabulary as an advance organizer. In H. Herber & P. Sanders (Eds.), Research in reading in the content areas: First year report. Syracuse, NY: Syracuse University Reading and Language Arts Center, 1969.

Brown, A. Knowing when, where, and how to remember: A problem of metacognition (Tech. Rep. 47). Center for the Study of Reading. University of Illinois at Urbana-Champaign, 1977.

Bruner, J. The process of education. New York: Vintage Books, 1960.

Bruner, J. Toward a theory of instruction. Cambridge, MA: The Belknap Press of Harvard University Press, 1966.

Carney, H. An investigation of the effects of the use of adjunct aids in ninth grade social studies materials. (Doctoral dissertation, Syracuse University, 1973). Dissertation Abstracts International, 1974, 34 6248A-6249A. (University Microfilms No. 74-8346)

Davis, F. Research in comprehension in reading. Reading Research Quarterly, 1968, 3, 499-545.

Davis, R. Psychometric research on comprehension in reading. Reading Research Quarterly, 1972, 7, 628-678.

Eamon, D. Selection and recall of topical information in prose by better and poorer readers. Reading Research Quarterly, 1978-1979, 14, 244-257.

Gerhard, C. Making sense: Reading comprehension improved through categorizing. Newark, DE: International Reading Association, 1975.

Golinkoff, R. A comparison of reading comprehension processes in good and poor comprehenders. Reading Research Quarterly, 1975-1976, 11, 623-659.

Goodman, K. Behind the eye: What happens in reading. In H. Singer & R. Ruddell (Eds.), Theoretical models and processes of reading. 2nd ed. Newark, DE: International Reading Association, 1976; pp. 470-496.

Guszak, F. Questioning strategies of elementary teachers in relation to comprehension. In J. Figurel (Ed.), Reading and realism. Proceedings of the thirteenth annual convention, International Reading Association, 1969, 13 Part I; pp. 110-116.

Hansen, J., & Hubbard, R. Effects of an intervention technique on the inferential ability of fourth grade good and poor readers. Paper presented at the meeting of the New England Research Association, 1980.

Herber, H. Teaching reading in content areas. Englewood Cliffs, NJ: Prentice-Hall, 1970.

Meyer, B. The structure of prose: Effects on learning and memory and implications for educational practice. In R. Anderson, R. Spiro, & W. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

Olshavsky, J. Reading as problem solving: An investigation of strategies. Reading Research Quarterly, 1976-1977, 12, 654-674.

Peters, C. The effect of systematic restructuring of material upon the comprehension process. Reading Research Quarterly, 1975-1976, 11, 87-111.

Rickards, J., & Hatcher, C. Interspersed meaningful learning questions as semantic cues for poor comprehenders. Reading Research Quarterly, 1977-1978, 13, 538-553.

Rothkopf, E. Some theoretical and experimental approaches to problems in written instruction. In J. Krumboltz (Ed.), Learning and the educational process. Chicago: Rand McNally, 1965; pp. 193-221.

Rumelhart, D. Toward an interactive model of reading. In S. Dornic (Ed.), Attention and performance, VI. Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

Sagan, C. The dragons of Eden. New York: Random House, 1977.

Senoff, G. What's in a name? The Science Teacher, 1976, 43, 40-41.

Spearitt, D. Identification of subskills of reading comprehension. Reading Research Quarterly, 1972, 8, 92-111.

Strange, M. Instructional implications of a conceptual theory of reading comprehension. The Reading Teacher, 1980, 33, 391-397.

Taylor, B. Children's memory for expository text after reading. Reading Research Quarterly, 1980, 15, 399-411.

Thorndike, R. Reading as reasoning. Reading Research Quarterly, 1973-1974, 9, 135-147.

Thurber, J. The Wonderful O. New York: Simon and Schuster, 1957.

Tierney, R., Bridge, C., & Cera, M. The discourse processing operations of children. Reading Research Quarterly, 1978-1979, 14, 539-573.

Tuinman, J. The schema schemers. Journal of Reading, 1980, 23, 414-419.

Wiener, M., & Cromer, W. Reading and reading difficulty: A conceptual analysis. Harvard Educational Review, 1967, 37, 620-643.

Toward a Method of Analyzing Reader Strategies

Pi A. Irwin
Tucson Unified School District

Judy Nichols Mitchell
University of Arizona

The purpose of this paper is to describe the rationale for and the procedures used in the development of a classification system of reading strategies used by adolescent readers in comprehending multiple samples of narrative and expository text. The classification system stems from the tradition of descriptive research methodology and has been influenced by the conceptual framework of recent process-oriented studies in the field of reading.

One objective in presenting this classification system is to expose for scrutiny the methods used in arriving at the various categories. A second objective is to compare and contrast this classification system with similar systems proposed by other researchers as to methodology, content and scope.

The following section will describe some characteristics of process-oriented reading research to provide a background for the introduction of the classification system. Next, a critical review of similar studies and classification systems will be presented. A subsequent section will describe the classification system of adolescent reading strategies, enumerating the procedures used in establishing it. Finally, conclusions and implications of this and similar studies will be offered.

Background

In his review of the state of comprehension research in 1971, Simons identified several major methodologies used to investigate reading comprehension. All, he noted, seemed limited by their concern with the products of comprehension rather than with direct investigation of the process it-

self. At that time the study of how readers process text while comprehending -- the investigation of what strategies readers employ -- had to be inferred from an examination of the products of reading.

Since Simons' call for greater attention to research directed toward understanding the processes involved in comprehension, the number of such studies has increased. Furthermore, the focus of many of these studies has shifted from an indirect examination of reading product to a more direct investigation of the process itself. These attempts at examining the process of comprehension more directly have relied heavily on analyses of post-reading recall of text, since the strategies readers use in comprehending are not directly observable. Of course, use of recall for the study of comprehension has a long history, dating back to Bartlett's discovery in 1932 that readers' "accuracy of reproduction (in recall) in a literal sense, is the rare exception and not the rule." Since that period, recall has been a fruitful area of study for psychological and educational researchers alike.

Post-reading recall data has supported comprehension process-oriented research in two main ways. One approach has been to elicit information about the strategies readers employ from the readers themselves through direct requests to describe what they are doing, thinking and feeling as they are reading a passage. This approach may be somewhat suspect since reading appears to be a largely unconscious process for experienced readers and therefore much data may go unreported.

A second more frequent approach has been to ask readers to recall what they have read and to comment on aspects of the text message to indicate their understanding of it. This latter method appears to offer objective insights concerning the comprehension processes of readers. A drawback of this approach, however, is that recall data gathered in this manner must

undergo a subsequent step of interpretation by researchers as to what it reveals about the strategies of readers, unlike the self reports of the former method.

Further support for the use of recall data to study the underlying processes involved in comprehension has been provided by Marshall and Glock (1978-1979). They stated, "By studying recall for information presented in a passage, one is not just studying the process of comprehension for written material. One is also studying the process of thinking that seems to be linguistically encoded." Additional support for the use of recall in comprehension research is given by Sharon Smith (1978) who noted that recall "provides a sample of the reader's own conceptualizations of the material and indicates how he is shaping his understanding of it."

One major methodology which has extensively employed recall data is discourse analysis. In this type of research, readers are asked to recall or retell what they have read. Both the responses of readers and the text content are analyzed in terms of a propositional or linguistic system, obtained by segmenting both the text and its corresponding recall into sub-sentential units of meaning according to definitions expressed as rules. Propositions in the reader's recall are then matched against those contained in the text.

In general, discourse analysis studies focus on such research questions as the accuracy and completenesss of reader recall, the effects of reader characteristics or schema on text comprehension, and the relationship of various textual features to reading comprehension. In this way, these studies nicely address the interaction between reader and text, but they fail to provide answers to questions about how readers comprehend text.

In order to deal with these latter type questions, a different methodology must be employed in the analysis of readers' recall data. Rather than match units of recall to units of text to learn what readers remember, this methodology uses recall data to identify the strategies by which readers comprehend text. In this type of study, the text does not serve as a standard or a template with which to compare recall; rather, it is used as a guide for researchers to interpret or infer the nature of the strategy which underlies what the reader verbalizes as recall.

A necessary first step in conducting this type of research is to determine the system by which the recall data will be analyzed. For most discourse analysis studies, the unit of analysis and the theoretical rationale for categorizing the units are established in an a priori manner and subsequently imposed upon the data. Under such constraints, data are used to validate rather than formulate the system for describing such data.

In contrast, researchers who focus on the categorization of readers' comprehension strategies allow the classification system to emerge from the data. In other words, the system takes shape by grouping like units of data into as many categories as necessary to define all types of occurring data according to the traditions of descriptive research. In reality, researchers may have some general notions about the categories they will find within recall data, but the important point is that the categories are actually developed by sifting through the data rather than making the data fit pre-established categories.

A review of three studies which have utilized these descriptive research techniques (Fareed, 1978; Olshavsky, 1976-77; Smith, 1978) may be helpful in illustrating the methodology. To a great extent, these studies have allowed the identification and categorization of readers' comprehending efforts to emerge from an examination of the data.

For all three studies, the primary data were readers' recall of text and for analysis purposes, reader responses were divided into sub-sentential units of meaning according to a system of rules. No attempt was made, however, to compare the reader recall with similarly devised textual units. The focus of these studies was to discover and to describe how readers come to comprehend text rather than to match text with reader recall. Text in these studies was employed, therefore, as a guide to interpret reader recall rather than as a standard against which reader recall would be assessed or analyzed.

While the rules employed to divide reader recall into units of meaning varied among them, Fareed, Olshavsky and Smith shared the assumption that these units indicated and/or reflected how the reader made sense of the text. These meaning units of clause or phrase lengths were variously labeled as strategies, processes or statements. Olshavsky used the term "strategies" which she defined as "purposeful means of comprehending the author's message." Fareed described interpretive processes and suggested that readers' verbalizations in response to text are "close manifestations of their interpretive processes in reading." Finally, Smith referred to her meaning units as information units.

Regardless of label, these meaning units were taken as indicators of the readers' efforts at comprehending. Thus, they could be compared and contrasted and used to develop classification systems which would describe how readers comprehend text. A review of each classification system follows.

The classification system developed by Fareed to describe his subjects' oral responses to what they had read will be first to be reviewed. Fareed's subjects were 12 "highly verbal" sixth grade students who silently read two types of expository text written by Fareed to be representative of

history and biology selections. Following their silent reading of the entire text, subjects orally summarized each passage. They then described their thoughts, feelings, and reactions to their first reading of the text as they re-read it in 50-word segments.

Fareed's classification system was based on what Fareed inferred from his subjects' verbalizations. He distinguished between subjects' responses related to the literal and inferential aspects of the passages as well as those responses that extended beyond the text.

The classification system of Fareed was as follows:

1. Reproduction--subjects basically restated, paraphrased what was read.

2. Inquiry--subjects inquired with regard to what they had read (ranged from trivial to carefully considered inquiries).

3. Personal judgment--subjects expressed personal opinions or reactions to text of either of the following kinds:
   a. emotive opinions or reactions--subjects expressed feelings, beliefs or values
   b. rational opinions or reactions--subjects' responses indicated logical reasoning.

4. Literary reactions--subjects reacted to style, language structure of what was read.

5. Association--subjects associated information in text to prior knowledge or experience.

6. Illumination--subjects illuminated the text message in one of the following ways:
   a. made comparisons
   b. related cause and effect
   c. noted if followed sequence of events of steps
   d. expanded, illustrated text message
   e. made a brief resume of ideas stated in the passage
   f. made a generalization implied from the content of the text.

7. Miscellaneous--subjects' responses were not classifiable under other categories.

Several factors, however, limited the generalizability of Fareed's findings. The sample size was both extremely small (12 subjects) and nonrepresentative of the general population of sixth grade students as sub-

jects were students at the University of Chicago Laboratory School. By Fareed's (1971, p.502) own admission, "This school is a private institution whose pupils come primarily from the families of businessmen, professionals, and the faculty and staff members of the University." Additionally, passages used in the study were written by Fareed to be representative of history and biology and to meet certain specified criteria. Clearly, they were not examples of naturally occurring text. Findings from Fareed's study, therefore, can be generalized only to populations of subjects and text similar to those used in his study.

A second classification system to be reviewed is one developed by Olshavsky (1976-1977) who contrasted responses of 24 good and poor tenth grade readers to narrative text (short stories) differing in style (abstract and concrete). Abstract style was defined as "an original or unusual means of expressing an idea" (Olshavsky, 1976-1977, p. 659) while concrete style was likened to journalistic writing and was described as "straightforward."

Subjects each read one short story silently, stopping at the end of each independent clause to recall what had been read and to describe what they were doing as they read. Subjects' responses were analyzed and ten strategies within three major categories were identified.

Olshavsky's system is presented as follows:

1. Word-related strategies
   a. use of context to define a word
   b. synonym substitution
   c. stated failure to understand a word

2. Clause-related strategies
   a. re-reading
   b. inferences
   c. addition of information
   d. personal identification
   e. hypothesis
   f. stated failure to understand a clause

3. Use of information about the story

Olshavsky distinguished between strategies related to the word-level, clause-level, or total story. One concern with Olshavsky's system was the manner in which the major categories skipped from relatively well-defined units of word and clause to a category encompassing the total story. In prose of 2,500 words, such as that used by Olshavsky, there are several intervening levels. Subjects' responses might reasonably be expected to relate to units other than those specified, such as single or multiple paragraphs or to major sections of the story (beginning, middle, and end).

An additional concern was related to Olshavsky's samples of text. Olshavsky selected the abstract and concrete styles because they appeared to be the "most distinct and well defined" (Olshavsky, 1976-1977, p. 659) from a list of six delineated by Carroll (1960). Selections used in the study were, therefore, not necessarily representative of the differing kinds of narrative writing. Any generalizations from this study must, moreover, be confined to those narrative texts fulfilling the same criteria Olshavsky specified for the abstract and concrete styles used in her study.

The final classification system to be reviewed here is one by Smith (1978) who studied the recall of an American history passage by 94 high school subjects. Smith classified subjects' responses in terms of their relation to the literal and to the inferential message of the text. She also accounted for responses that supplemented or extended beyond the text.

Smith's system to classify readers' statements consisted of three major categories and several subcategories, summarized as follows:

1. Recall--statement deals with explicit text information
   a. repetition of text
   b. paraphrase of text
   c. erroneous repetition or paraphrase

2. Inferences--statement based on text information
   a. conclusions
   b. generalizations
   c. logical reasoning
   d. statement summarizing
   e. identification of key ideas or structure of the text
   f. formulation of hypotheses
   g. formulation of questions

3. Supplementation--statement relates outside the text
   a. addition of information
   b. association of text-explicit or inferred information with information outside text
   c. evaluation of text, task or general subject matter
   d. application of concepts or principles given explicitly or implicitly in the text or outside the text

The passage used in Smith's study was selected because it met specified readability requirements and was thought to elicit recall, inferential and supplementary responses. Generalizability is, therefore, limited to situations involving text meeting the same requirements.

A comparison of the classification systems reveal some similarities. All three identify inferences, addition of information, personal identification, and hypotheses. Additionally, the Smith and Fareed systems distinguish strategies/processes that relate to the explicit and implicit message of the text. Both also allow for strategies that relate text information to situations extending beyond the text. For example, Fareed's category of reproduction appears comparable to Smith's recall category, and his categories of inquiry and illumination seem similar to Smith's inference category. Further, Fareed's categories of personal judgment, literary reaction, and association are very like Smith's subcategories within the category of supplementation.

While there are several similarities in Fareed's and Smith's classification systems, each accounts for categories not found in the other. For instance, Fareed, unlike Smith, accounted for reader recall of sequence of events.

Olshavsky's classification system differs from both Fareed's and Smith's. Her classification system consists of a smaller number of categories and subcategories. She also does not account for readers' responses to the literal or explicit message of the text and to situations extending beyond the text. On the other hand, her classification system includes strategy use according to what subjects reported they were doing while reading--re-reading, etc. This is an item not accounted for in the Smith and Fareed systems.

Classification systems such as those developed by Fareed, Olshavsky and Smith demonstrate that readers' recall of text can be classified and categorized in a meaningful way. Additionally, they illustrate that systems of this sort can be used to delineate the strategies and processes actually used by readers to comprehend.

While these three studies have provided insights into how readers comprehend text, all have limitations which have been previously noted. Additionally, all share a common limitation -- use of text samples which appear to be nonrepresentative of any larger population of text. To the extent that text differing in type (expository, narrative), style, and content affects the nature of reader strategy selection and usage patterns, conclusions based on these studies may not be valid for all text types. It likewise follows that comprehension classification systems emanating from these studies may be generalizable only to text of similar type, style and content. Gagne and Memory (1978) have noted the importance of the use of multiple samples of text in their statement, "For research to be educationally relevant, there is a point at which the main purpose of the research must be to establish the generality of the results. In reading research, this often means randomly sampling from a population of passages."

Discussion of the Study

This study sought to describe and classify the strategies used by adolescent readers in comprehending multiple randomly selected samples of naturally occurring expository and narrative text. Subjects were 24 tenth grade good readers who read and recalled 12 short story and 12 earth science text selections. The subjects were randomly selected from tenth grade students at a large high school in southeastern Arizona whose achievement scores on a standardized reading test ranged from stanine 7-9. No subject was enrolled in an earth science course during the year in which the study was conducted. The selection of subjects not studying earth science facilitated the replication of what was determined to be the most typical school reading situation--reading to learn new information. Further, the selection of good readers ensured that strategy identification would not be hampered by readers' problems with the basic mechanics of reading.

Subjects' strategy use was identified through an analysis of their "thinking aloud" in regard to their silent reading of both an earth science and a short story selection. Selections were randomly assigned to subjects from a variety of types of 12 each of earth science and short story selections which had been randomly selected from texts currently in use in the school district in tenth grade language arts and earth science classes. Use of several samples of naturally occurring text was thought to increase the ability to generalize from results of the study and to provide a more comprehensive and accurate assessment of readers' strategy use than would one or two samples of text. Each of the selections, which were counterbalanced for order of presentation, was read by two subjects. Additionally, measures were taken to ensure that no subject read a selection which he/she had read previously.

Subjects' "thinking aloud," data, which included recall of what they had read and descriptions of what they were doing, thinking, and feeling while reading, was recorded and transcribed. For purposes of analysis and interpretation, the transcriptions of subjects' "thinking aloud" protocols were placed adjacent to the text to which they corresponded.

An example of the juxtaposition of text segments and protocol segments is presented below:

Text	Protocol
The ocean is never still. Usually the surface is roughened by ripples or waves.	This first passage in the science is telling how an ocean is never really very still. The surface is usually rippled or there are waves.

Each protocol was then subdivided into "thought units." A thought unit was defined as the smallest unit which indicated strategy use. In general, a unit approximated a clause containing a subject and a finite verb. Such a unit was similar to Fareed's (1971, p. 508) "idea unit," defined as "the minimum number of words that convey the sense of a single thought or feeling" and to Smith's (1978, p. 77) "information unit" described as "any subject and finite verb." An example of the segmentation of a protocol into thought units follows.

Thought units: /This is a story about a young athlete./
He's a young boy,/ and he suddenly becomes a man / and he
feels it physically and emotionally, too./

The thought units represented complete ideas and could be matched against corresponding text to permit identification of particular reading strategies. Divisions of protocols into thought units ensured standardization in identification of strategy use. Further, each text selection and the corresponding protocols from two different subjects were examined at one sitting to provide for consistency of treatment.

After all protocols had been segmented into thought units, two outside judges verified thought unit designation for 14 randomly selected protocols. Agreement ranged from 91 to 100 percent, indicating high accord with the original decisions in segmenting units.

Procedure Used in Strategy Classification

The next phase of the analysis involved the establishment of procedures to allow the grouping of like thought units into categories reflecting similar reading strategy use. From the outset, a deliberate effort was made to allow identification of strategy use to emerge from examination of the data. Investigations of or comparisons with other existing systems for identifying or classifying strategy use, therefore, were avoided at this time. In all, four complete analyses of the data were conducted. In each the same general procedures described below, were followed.

Text selections and their accompanying protocols were randomly sorted by selection number within each of the major text types: earth science and short story. Earth science selections were analyzed first. Selections were read in the order in which they had been randomly arranged. When all earth science selections and protocols had been read and analyzed, the procedure was repeated with the short story selections.

First Analysis of Data. In the first analysis of data, each thought unit was examined and a description or designation of the subject's strategy use was placed above the thought unit. Development of two types of lists contributed to ensuring that strategy identification and classification evolved from rather than being imposed on the data. The first list consisted of all strategies or descriptions of strategies which were identified while the protocols were being read. This list was compiled during this first analysis of the data. Examples of items in the first list were

re-reading, using prior knowledge, recalling text verbatim, personal identification, using context to get at meaning of words, and paraphrasing the text. As strategies were identified, they were added to this list. The list served to document all strategies which were identified and was maintained throughout the data analysis.

In the second list, thought units which indicated the same strategy use were sorted together. This list was developed following the first analysis of data and was revised as subsequent analyses were completed.

An example of the way in which the second list functioned can be seen with the strategy of "conjecturing." Groups of thought units sorted under conjecturing appeared to indicate the same strategy use. With each, the subject elaborated upon information provided in the text, but expressed tentativeness by use of such qualifying terms as "maybe," "I guess," and "probably." Examples of these are:

> "The next sentence says their accumulation area, probably where the snow falls."
>
> "It goes on to say that the children were trying to conceal something--maybe something had happened or something was wrong in the family."
>
> "His mother's probably having a heart attack right now."
>
> "It's probably someplace in Europe."
>
> "His wife, I guess, died."
>
> "I guess you call him the hamburger maker."
>
> "He was trying, I think, to cheer her up."

The sorting of thought units in this manner permitted a comparison of thought units within groups. Those thought units which were not parallel to others in a given group were reexamined. This procedure facilitated the

later development of categories to accommodate strategies and of comprehensive definitions to explain and clarify strategy use.

On the basis of the second list, a classification system to accommodate strategies began to emerge. Two categories were particularly apparent. Both were related to the text message and were, therefore, referred to as "message-oriented." In one, subjects' strategy use indicated a focus on comprehending the explicit or surface message of the text. Subjects' thought units were restatements or paraphrases of the exact or approximate text content. An example of a restatement and paraphrase is shown below.

Restatement:

Text	Subject Response
The ocean is never still.	This first passage is telling about how an ocean is never really very still.

Paraphrase:

Text	Subject Response
Hunt put on old clothes from which all tailors' tabs and laundry marks were removed.	It says that all the tags have been taken off the clothes. The body is wearing old clothes. Saying the guy's name is Hunt.

In the other category, subjects' strategy use appeared to be directed toward comprehending the implicit or inferential message of the text. This was noted in thought units which, while based on the text content, extended beyond and elaborated upon it. Several different types of implicit strategies were noted. Examples of two of those are listed. The first is an example of interpreting. Interpreting was defined as the subject's elaborating upon text but expressing no tentativeness in regard to his statements.

Interpreting:

Text	Subject Response
Bird is described as "remarkably fine--charming character--affable to the other birds in the aviary," etc.	He's the best bird in the whole zoo.

Another example of subject response to the implicit message of the text was in the strategy of predicting. Predicting occurred when subjects formulated hypotheses concerning what would happen next in the text. An example is shown below.

Predicting:

Text	Subject Response
Proprietor's attempts at soothing hurt feelings are described.	In the next part he'll explain what she really meant.

Two additional categories were noted but were not clearly formed nor defined. Strategies representative of one of these categories consisted of subjects' reports of how they handled the text print. Among examples in this category were subjects' descriptions of re-reading, using context to decode a word, and visualizing. Examples of these are included.

Re-reading (subject response)

Then I re-read the part where he was talking about the woman who always says "wonderful."

Use of context to decode word (subject response):

Some of the words in that passage I didn't understand so I just tried to finish reading the sentence and then tried to figure out what the words could have meant, how they relate to the rest of the sentence.

Visualizing (subject response)

I was trying to picture these places on a map.

The other category included subjects' comments that went beyond the text, but which were not text dependent. Subjects' attempts to recount personal experiences and opinions were among examples in this category. Two examples are listed.

Use of personal opinion:

Text	Subject Response
Describes support for Continental Drift theory.	I was thinking about how I had thought at one time that Saudi Arabia Peninsula did look like it should have fit into Africa.

Text	Subject Response
- - - -	It sort of dawned on me that this story is pretty strange, youngish.

Second Data Analysis. Following the procedures guiding the first analysis, the selections and protocols were reexamined. Each though unit and the original description of strategy use were reviewed in relationship to the group of thought units to which the thought unit appeared to belong. If the initial designation appeared appropriate, no changes were made. If, however, the original designation seemed inaccurate, the thought unit was reclassified.

Following the second analysis, attention was again directed toward development of a strategy use classification system. The two major categories of message-oriented implicit and explicit strategies identified following the first analysis were retained. The two additional categories which had been previously noted were now more precisely defined. One category was designated as representative of print-oriented strategies. Some of the strategies placed in this category include:

Re-reading:

Then I re-read the part where he was talking about the woman who always says "wonderful."

Use of graphics:

I kept looking at the picture of the open pit mine that they have on this page.

Deliberation:

I had to read a little bit slower to pick up every word because it was pretty important to get every word.

The remaining category was thought to be indicative of subjects' efforts to integrate and/or evaluate the explicit or implicit message of the text. It was, therefore, designated as a category of "message-oriented integrative-evaluative" strategies. Among examples in this category were those relating text information to prior experiences. An example is shown below.

Use of prior experience:

Text	Subject Response
Describes job of paleontologist.	I was thinking about my trip down the Grand Canyon. A guy told us all about the different layers of rocks and how old each layer was.

Another example of the subjects' attempts to generalize beyond the text in order to make an application or evaluation to situations outside the text is shown below.

Generalizing beyond the text:

Text	Subject Response
Describes son unable to control horse, calling for mother.	People when they need help, they call for their mothers.

Third Data Analysis. The procedures followed during the first and second analyses were repeated as selections and protocols were reexamined. Each category was assigned a color to facilitate categorization. Thought units with their strategy use designation were reexamined in relationship to the group of thought units to which they appeared to belong. If the original designation was considered appropriate, no changes were made. The thought unit was then further categorized into one of the four major types of strategies by underlining it in the color corresponding to the appropriate category. If strategy use designation was inaccurate, the thought units were reclassified prior to being categorized into one of the major categories.

A review was now made of existing systems for identifying and classifying strategy use. Identification of a system used by Sharon Smith (1978) to categorize readers' retelling statements was helpful in finalizing the classification system. Smith had sorted statements into three major categories: recall, inference, and supplementation. These were similar to three of the four categories developed for this study. Smith's recall category was similar to the message-oriented explicit category, while her inference category resembled the message-oriented implicit category of this study. Supplementations corresponded to the message-oriented integrative-evaluative category. The category of strategies dealing with subjects' responses to print was not accounted for in Smith's system. Smith's system was also helpful in revising and making strategy definitions more precise.

Fourth Data Analysis. Procedures previously used in analyzing data were repeated a fourth time as a validity check. Each thought unit was scrutinized in relation to three questions:

1. Regardless of prior designation, what strategy use does this thought unit indicate?
2. Does this thought unit share common characteristics with other thought units which have been classified as expressing a specific strategy?
3. Has the strategy indicated by the thought unit been appropriately placed within the four major categories of strategy use?

Any thought units or strategies which appeared to have been classified erroneously were reexamined and reclassified.

Presentation of Strategy Classification System

Following the four complete but separate analyses of the 48 protocols and their corresponding 24 texts, groups of similarly designated strategies were arranged in a classification system. Four major strategy categories and 18 strategy subcategories were identified. For reliability purposes, two outside judges verified strategy classification for eight randomly selected protocols. Agreement ranged from 81 to 91 percent indicating concurrence about the apparent discreteness and consistency of the various strategy categories.

The classification system which resulted from these analyses is presented as follows:

1. Print-Oriented Strategies
   a. re-reading
   b. use of context to determine meaning of word
   c. use of other to determine meaning of word (defined in passage, use, or footnote)
   d. use of graphics--pictures, headings, graphics
   e. deliberation
   f. visualizing, imagining

2. Message-Oriented Explicit Strategies (based on text)
   a. restatement of text
   b. paraphrase of text

3. Message-Oriented Implicit Strategies (based on text)
   a. making inferences based on text (interpreting, conjecturing, drawing conclusions)
   b. engaging in logical thinking
   c. examining alternatives
   d. predicting

4. Message-Oriented Integrative-Evaluative Strategies (extending beyond text)
   a. relating text information to prior experiences or knowledge outside text
   b. critiquing text, text structure, task, or general subject matter
   c. generalizing beyond text by making an applicaton or evaluation to situations outside text
   d. adding information of a factual nature to text information
   e. indicating awareness of new learning
   f. making judgments in regard to text content
   g. anticipation--indicating desire to read ahead

Conclusions and Implications

The establishment of a strategy classification system from the analysis of post-reading protocols of multiple subjects who read multiple texts presents new insights about the range of reading strategies utilized to comprehend a variety of texts. This classification system elaborates upon those of Fareed, Olshavsky and Smith in that it provides a broader base from which generalizations may be made concerning reader comprehension.

This classification system appears useful because it describes the type of reading strategies available to and employed by tenth graders who are good readers. It is therefore possible to use this system to compare the type and frequency of strategies used by students in reading expository and narrative texts; to compare strategies students actually use in reading to those which textbooks (or teachers) advocate they be taught; to compare strategy use of successful readers with that of less successful readers; to examine the reading requirements, or demands of texts, in terms of the range and variety of strategies needed for comprehension.

Several cautions, however, need to be exercised in the interpretation and application of any classification system developed in this manner. First, the system is based on what readers recall after they read and what they remember of what they were thinking and feeling as they were reading. To that extent, limitations imposed by such variables as short-term memory, perception of the recall task, and verbal fluency of readers affect the nature and the quality of the recall data from which the classification system was developed.

Second, the unit of analysis, whether termed a "thought" unit, "information" unit or "idea" unit, etc., is a somewhat arbitrary segment, although it can be defined syntactically and semantically. In the case of this study, thought units did appear to reflect or correspond to the use of individual comprehension strategies. There is no sure way to know if this is a real rather than artificial correspondence, however, since reading comprehension is not directly observable. It may be, therefore, that the meaning units which define and compose the classification system do not correspond to actual strategy use. In this study, however, the reliability measures related to both the information unit designation and the strategy classification would suggest that these categorization decisions have psychological reality.

Lastly, all classification systems of this sort are developed according to the performance of a given age and proficiency of reader. This classification system was based on the performance of tenth grade good readers and it may or may not describe the strategies available to younger or older readers. Developmental psychology would suggest that children's cognitive abilities develop through stages, and therefore, this system may reflect a stage of development rather than a universal phenomenon.

Despite the limitations inherent in this type of descriptive research, efforts at describing how readers come to comprehend text provide us with new understandings of the comprehension process. While we cannot be sure that they accurately mirror the comprehension process, they do yield new models which can be scrutinized and critiqued, therefore adding to our cumulative knowledge of the comprehension process.

Studies of this nature also enable us to improve and refine our instruction of students. As Simons has noted, "The more effectively instructional techniques take advantage of the actual learning process, the more efficiently a student will learn. If this is correct, then research efforts directed at uncovering basic processes will help improve instruction by making it easier to capitalize on these processes."

References

Bartlett, F.C. Remembering: A Study in Experimental and Social Psychology (2nd Ed.). Cambridge: Cambridge University Press, 1961.

Carroll, J.B. Vectors of prose style. In T.A. Sebeok (Ed.) Style in Language. New York: John Wiley & Sons, 1960.

Fareed, A.A. Interpretive responses in reading history and biology: An exploratory study. Reading Research Quarterly, 1971, 6, 493-531.

Gagne, E.D. and Memory, D. Instructional events and comprehension: Generalization across passages. Journal of Reading Behavior, 1978, 10, 321-335.

Marshall, N. and Glock, M. Comprehension of connected discourse: A study into the relationships between the structure of text and information recalled. Reading Research Quarterly, 1978-1979, 14, 10-47.

Olshavsky, J.E. Reading as problem solving. Reading Research Quarterly, 1976-1977, 14, 654-674.

Simons, H.D. Reading Comprehension: The need for a new perspective. Reading Research Quarterly, 1971, 11, 339-363.

Smith, S.L. Learning from reading at the secondary level: An investigation into cognitive operations employed in the reconstruction of text. Unpublished doctoral dissertation, Indiana University, 1978.

REFLECTIONS

This issue marks the beginning of our new feature, "Reflections." It consists of your reactions to articles appearing in past monographs.

We invite and encourage all readers to submit a reflection for our next issue. Your reflections should be brief, about 1 to 3 pages and should comment on the quality of research and/or the importance of the questions asked and the issue raised by the author.

We hope to continue this dialogue between scholars concerned with secondary reading research.

Reflections on: SQ3R: Retread or Retire?

James E. Walker
Northern Illinois University

More than forty years ago, F.P. Robinson introduced the idea of SQ3R. In the second volume of this monograph series, Frank Spencer reviewed the research on the topic: "SQ3R: Several Queries Regarding Relevant Research." Spencer's analysis continues to question its use. The overall conclusion seemed quite apparent; there is very little research support for the SQ3R strategy. Yet, we all know the ease with which textbook authors readily include a discussion on how important it is to teach this strategy, especially to adolescent readers. The strategy, it seems, has almost become a "sacred cow" in our work.

More recently, Johns and McNamara (May 1980 Journal of Reading) considered the same question as did Spencer. Although they included some more recent references in their article, they came to the same conclusion as did Spencer.

Just last year, Vacca in his Content Area Reading said:

> Most secondary school students may find it difficult to SQ3R on their own. In fact, I personally have never known a secondary student to SQ3R on a regular basis. Maturing readers need more structured guidance to study reading assignments than SQ3R, when attempted independently, can offer. (p. 112)

Reflecting on Vacca's observation, I can only say that my own teaching bears out his claim never to have known a high school student to use this strategy regularly.

Six years ago I thought I had resolved the case of why SQ3R was not used more than it is. I postulated (March 1976 Illinois Reading Council Journal) that simply to tell students about the strategy was not sufficient. Rather, teachers should work at great length, perhaps at least one

semester in time, to instill the application of the strategy in their students. The problem, as I thought I had figured out, was that students needed to internalize the procedure so that it becomes almost second nature. But Spencer's analysis makes me wonder if this position is also unwarranted. Perhaps some conclusions are justified from what has been said here.

Olive Niles in 1965 suggested that the strategy is better suited for students in the eleventh or twelfth grades and not earlier. It would seem that the strategy, if taught at all, might be restricted to advanced high school students and to most college students.

To carry this notion one step further, how many college professors, even reading educators, use the strategy regularly? In doctoral studies, how many of us actually used the Survey, Question, Read, Recite, and Review steps? I can say without hesitation that I do not use SQ3R. To take this discussion one step more, even with students who might use the strategy, how many use all five steps in the procedure? I hope we might address the more practical point to what I have said here. Perhaps it is more appropriate to teach, not SQ3R, a five-point strategy, but to adapt it more realistically to a three-point play: Survey, Read, and Recite. The latter step, of course, can take on many forms, but Pauk has suggested that unless the student has some type of recitation or feedback, the student is not likely to know how effective the reading really was. In this case, why read the material at all?

Another way to consider the effectiveness of the strategy is to look at the research topics now chosen by doctoral students. There seems to be virtually no interest at all in researching the SQ3R strategy. Doctoral students are traditionally on the cutting edge, certainly when it comes to

their desires to address topics which are current and relevant. Their avoidance of study systems such as SQ3R is indicative of something.

Frank Spencer's questioning of the SQ3R is more than justified. Perhaps the SQ3R is not as sacred as we would like to think.

Reflections on: And Did He Say It, or Did She? Selected Gender-Related Variables and Mature Reading Response

Paula J. Gaus
Fairfield University
Fairfield, Connecticut

The article by Juergens-Ellsworth and Stockseth (Research on Reading in the Secondary Schools, #8, Fall 1981) deserves comment. Specifically, three issues raised by the authors present themselves for discussion and expansion. First, the review of findings relative to reader response to sex-of-author deserve dissemination beyond the scholarly community. Second, the findings from the review of required reading lists is discomforting when examined from an historical perspective. Third, the study as presented does not expand upon the lack of diversification in main female characters' roles. The comments which follow are related to these three issues.

It is disturbing to see that an article such as this one still needs to be written in 1981. In 1971, the National Organization for Women adopted a policy statement on the portrayal of women in textbooks. Among the thirty-four resolutions are calls for female characters who are independent persons, problem solvers, creators and executors of ideas and who portray professional, vocational, executive and social roles for women. Interestingly, the NOW statement does not explicitly address the need for the inclusion of female authors in school texts. The Guidelines for Publications, endorsed by the National Council of Teachers of English in 1971, also expresses concern about the role and status of women in printed materials. Further, the NCTE publication specifically states that "a publication which deals fairly with women publishes articles by women."

Although the NCTE guidelines address the sex-of-author issue, they are intended primarily for use by "the Council and the profession." Research such as that reported by Juergens-Ellsworth and Stockseth should be disseminated widely beyond the profession; the hope is that NOW and other organizations which publish guidelines intended for use by the general public will add sex-of-author to the list of concerns.

NOW followed the policy statement with a survey of sex-role stereotyping in 2,760 stories in one hundred thirty-four elementary basal readers (Dick & Jane as Victims: An Analysis by Women on Words and Images, Princeton, 1972). The results indicated a gross over-representation of male to female-centered stories (5:2), male to female biographies (6:1), and male to female occupation variability (6:1).

This study prompted informal but similar studies of secondary texts. One such study was completed using popular Illinois English curriculum materials (Gaus, unpublished, 1972). In one part of the study, six American Literature anthologies were evaluated in terms of the ratio of female to male authors (1:8), and image of women. Female characters were depicted predominantly in supportive roles: wives, girlfriends or mothers; occasionally as teachers or entertainers. In another component of the study, twenty-three novels required in high school English curriculums were evaluated for sex of author (male = 20), sex of main character, and roles of female characters. Eleven novels portray a completely masculine world which contains only male main characters; females are infrequently mentioned and even more seldom appear. Twelve novels contain both male and female characters: of these, five portray "flawed" women in the role of bitch or whore and the remaining seven portray women in supportive, symbolic, or mediocre roles. The roles assigned to female characters in

required reading, briefly mentioned in the Juergens-Ellsworth & Stockseth article, should be considered in conjunction with the matter of male-to-female author ratio. There are irrefutable similarities on both counts between my 1972 study and that conducted ten years later. The question begs to be asked: Why do we not see improvement in the status of women as authors and the image of women as characters?

The seeming indifference can be explained partially by the lack of evidence supporting a relationship between reader response and sexual bias of reading materials. The need for this type of research and documentation is correctly highlighted in the Juergens-Ellsworth and Stockseth report.

Another factor relates to the inability of high school English faculty to admit major text changes into the curriculum. All but three of the fifteen novels appearing on the 1981 list appear on my 1972 list. (If it is of interest, the three "new" books are Black Boy, Easy Rider, and Shane.) Budgetary restrictions are often a strong consideration in curriculum decisions. However, the evidence here seems to indicate that sex of author and image of female characters were not major concerns when curriculum revisions did occur. Minority representation does seem to be a priority. Since that representation has been sought since the early 1950's, perhaps the year 2000 will see the fair representation of women as a priority. I think we all have to come to our own conclusions about that.

Reflections on: The Effects of a Content-Area Reading Institute upon Teacher Planning

Lynne Miller
University of Arizona

According to Patberg, Dewitz, and Henning (Research on Reading in Secondary Schools, #5), the stated purpose of their research report was to describe the effect of a two week reading improvement institute on teachers' attitudes toward teaching reading in content areas and on teachers' ability to integrate content area reading strategies in their instructional plans. The researchers remarked that a subsequent study is planned which will include classroom observation of the institute participants in which the researchers will evaluate the actual implementation of content area reading strategies.

There were 33 junior and senior high school teachers from various content areas involved in the institute and, therefore, in the study. The collection of data for the report discussed in this critique was collected (1) for changes in teacher attitude regarding fifteen (15) specific strategies for reading in the content area, using a four point Likert scale, and (2) for reading strategies included in lesson plans, using a simulation technique. In the first part of the report, the authors described the program and activities of the institute, presented four specific objectives for their study, and reviewed the literature pertaining to their topic. In this review, the researchers stated that few if any reports on inservice evaluation based on implementation in the classroom of new strategies learned. The researchers went on to discuss methodology. All participants completed a pre- and post attitude questionnaire designed to measure their perception of the content area teaching strategies presented in the institute. They also completed pre- and post simulated lesson planning tasks

which were designed to reveal what content area reading strategies the participants planned to use in their instruction. The results showed improvement in teacher attitude toward content area reading instruction and that many more strategies were mentioned in the post than in the pre-simulation lesson planning task.

In answering the question "Does this study make sense?", this reviewer must answer a little "yes" and a big "no". The researchers did attempt to pursue the important topics of teacher attitude toward content area reading and how reading strategies can be taught to teachers who can then implement the strategies in the classroom; however, their work, as they presented it in the form of a research study, is too weak to be of any value at all. With the data they had to work with, Patberg, Dewitz, and Henning should have written a summary of the institute and left it at that. This opinion is based on the following: key terms were not defined; there was no mention of controlling any variables; no reliability or validity information was given for the data collecting instruments; no mention was made as to how the 33 participants came to be part of the institute and how this may have influenced the results; and, there were no levels of significance mentioned which would show whether there was indeed "significant" impact on teacher attitude and use of reading strategies in planning lessons. Furthermore, throughout each section of the report the authors mixed in their comments and opinions with their reporting of facts such that the report was far too wordy and disjointed. Based on the information and data presented and the lack of any sound foundations, neither the authors nor any reader should base any generalizations on the "results" of this "study".

The principle problem with the "study" was that the authors tried to fit their information to a research format when it was clearly inappropriate to do so. If the researchers wanted to conduct a research investigation, they should have designed their study in a tighter, more controlled way. Nonetheless, this reviewer did glean two bits of valuable information from the report: (1) make sure the format of a report fits the material being presented; and (2) the notion of evaluating inservice training based on classroom implementation of new strategies may be a worthwhile concept to pursue.

Reflections on: Is Practical Significance Practical?

Priscilla V. King
University of Arizona

Baldwin and Moore (1981) have argued that a measure of practical significance should be included in reports of educational research and have advocated the correlation ratio, eta, as an acceptable index of practical significance. They are correct in stating that tests of statistical significance do not yield information describing the magnitude of differences between experimental and control groups. Rather, tests of statistical significance relate the probability that observed differences could have arisen if the null hypothesis were true. Because increasing the number of subjects or observations usually reduces error variance, a relatively small effect can acquire statistical significance in a large sample. Thus, a result significant at the .00000000000000001 level of confidence is not necessarily bigger or better than a result significant at the .05 level. Stated differently, to be significant at the .05 level of confidence, an effect must be bigger if the observations represent a sample of 5 than if they represent a sample of 50. Given this state of affairs, an index of practical significance which expresses the relative size of the treatment effect has great appeal. However, the selection of an appropriate index and the determination of acceptable effect size criteria are more complex than Baldwin and Moore acknowledge. Further, the most commonly used ratios, which include eta, are likely to be misleading when applied to results obtained from the usual educational research design.

Keppel (1982) describes three measures of relative strength of effect that are sometimes reported: omega squared; epsilon squared; and eta, which is also referred to as the correlation ratio or R^2. (Equations

describing these measures are presented in the Appendix.) The procedure for determining eta suggested by Baldwin and Moore is identical to the computation of R^2 described by Keppel, except that they recommend reporting the square root rather than the squared value of eta. With Baldwin and Moore's procedure, if the value of eta (R) is .71, then with Keppel's procedure, the value of eta (R^2) is .50. While these values are conceptually identical, they present a source of practical confusion with respect to standards of reporting. Further, although omega squared and epsilon squared are conceptually similar to eta, they yield somewhat different values, with omega squared consistently yielding the most conservative estimate of treatment magnitude. Any one or all three can be computed for any given analysis of variance, and the choice of which procedure to use is currently arbitrary. Therefore, in comparing reports which include a measure of treatment effect size, care must be taken to determine and equate the computational procedures used.

Another problem arises when interpreting strength of effect measures. The value of eta, or R^2, or epsilon squared, or omega squared can range from .00 to 1.00, and the larger the value, the larger the effect of the treatment. But within this range, how large is large? Baldwin and Moore say that ".20 is considered small, .50 is moderate, and .80 is considered large" (p. 25). On the other hand, figures given in Keppel suggest that in behavioral and social sciences, because error variance is usually a substantial component in any set of results, a value of .01 is small, .06 is moderate, and .15 is large. The square roots of these values are .1, .24, and .39, respectively.

Instead of arguing about which set of effect size criteria should be applied to research results, using criteria related to the purpose of an evaluation is more relevant to the point of practical significance, judging

whether a result is important enough to justify modification of current practice or theory. Obviously the modification involved might be modest, moderate, or monumental, and only the latter requires a very high value of eta. For example, establishing a Sustained Silent Reading period in a school might produce rather small increments in measures of pupil reading achievement or interest. Adoption of the program might still be justifiable since the cost of implementing it is also quite small. Conversely, to show that a text publisher should revise an entire basal reading series to produce gains in measures of reading achievement or interest would require very great practical significance because of the large cost of such a modification.

Dunnette (1966) reported an application of eta to a sample of 112 articles from four American Psychological Association journals. The distribution of the correlation ratios ranged from .05 to .92, although he did not say whether these were R or R^2 values. The median value was .42, and a third of the studies sampled had treatment size effects of less than .30. Although Dunnette used this information to argue that the results of many experiments are trivial, it is possible to use his data to argue the opposite case. Less than one-sixth of the studies had treatment effects which were less than moderate according to the criterial values suggested by Keppel. Deciding whether a treatment effect has practical significance, then, may depend upon whether the evaluation is done by a pessimist whose cup is half empty or an optimist whose cup is half full.

Arguments based on inconsistency in application or interpretation of practical significance measures call for remedies, but they do not seriously refute the validity of the correlation indices of effect size. There is, however, a serious flaw in the logic of applying omega squared,

epsilon squared or eta to fixed effects designs, and this flaw has been clearly described by Keppel (1982), Glass and Hakstian (1969), and Norton and Lindquist (1951). The logical error can be described with reference to the experiment by Soares and Simpson (1967), which Baldwin and Moore considered useless because the eta values for its main and interaction effects were small.

The fixed effects design is used extensively in educational research. In this design, the experimenter uses a deliberately chosen subset of all possible independent variable levels. It is rarely possible to study all levels of the independent variable. It can be done if the variable has a highly restricted range of levels. If sex is of interest, it can be studied completely since there are only two levels of the variable, male and female. Usually, however, the independent variable has a much greater, and often infinite, range of levels. Soares and Simpson were interested in the effects of grade, sex, and ability on the interest ratings of short stories. The levels of the grade variable selected could have extended from kindergarten through graduate study. But Soares and Simpson studied seventh, eighth, and ninth graders, apparently because they were particularly concerned with junior high students' reading preferences. They found a small but significant difference between these grade levels. The eta value for their result is .08. Does this mean that grade level has no practical significance with respect to short story preferences? Possibly it does. But what if Soares and Simpson had compared the interest ratings of first graders, seventh graders, and college freshmen? Clearly, if there is a difference in reading preferences related to grade level, the size of the difference can be apparently expanded by expanding the range of the grade levels studied. With a wider range of grades, an increasing value of

eta is to be expected. In other words, there is no one value of eta describing the effect of the grade level variable, since eta varies with the range of levels of the independent variable.

Consider as a second illustration the effect of limiting the reading preference variable to short stories selected from junior high and high school anthologies. Although studying the preference ratings for text book materials may have practical interest for educators and text publishers, this represents a closely restricted subset of the possible range of reading materials which could be used in junior high classrooms. Had Soares and Simpson expanded the levels of this variable to include newspaper articles, novels, poetry, or any other class of possible reading material, they might easily have obtained much larger treatment effects. Again, the size of their treatment effect was limited by the restricted range of levels of the reading material they selected to represent the independent variable. The low value of eta obtained is, therefore, relatively meaningless.

Expressed in more general terms, studying a narrow range of levels of an independent variable reduces the likelihood of obtaining a large treatment effect. And if demonstrating a high level of practical significance based on an index of practical significance is an objective of research, the cure is to include an extreme group in the experimental or control procedure.

Practical significance should certainly be considered, both in planning research and in evaluating its outcome. However, practical significance is also a complex problem which cannot be solved by the application of a simplistic formula and rigid critereia. One lesson in addition is not likely to produce much of an increment in the knowledge of first graders

with respect to mathematics, or even addition. Teachers do not abandon the lessons because of a practically insignificant outcome based on a single lesson. Rather, they continue the lessons, expecting that small treatment effects will eventually result in a practically significant outcome. However, because eta is not related to the range of treatment levels, it does not add up to a reliable or informative estimate of practical significance of treatment effect.

APPENDIX

$$\text{Omega squared} = \frac{SS_A - (a - 1)(MSS/A)}{SS_T + MS_S/A}$$

$$\text{Epsilon squared} = \frac{SS_A - (a - 1)(MS_S/A)}{SS_T}$$

$$R^2 \text{ or eta} = \frac{SS_A}{SS_T}$$

References

Baldwin, R.S., & Moore, D.W. Significance in research: What does it mean? Research on Reading in Secondary Schools: A Semi-Annual Report, Monograph Number 7, Spring 1981, 22-30.

Dunnette, D. Fads, fashions, and folderol in psychology. American Psychologist, 1966, 21, 343-352.

Glass, G.V., & Hakstian, A.R. Measures of association in comparative experiments: Their development and interpretation. American Educational Research Journal, 1969, 6, 403-414.

Keppel, G. Design and analysis: A researcher's handbook. New Jersey: Prentice-Hall, Inc., 1982.

Norton, D.W., & Lindquist, E.F. Applications of experimental design and analysis. Review of Educational Research, 1951, 21, 350-367.

Soares, A.T., & Simpson, H. Interest in recreational reading of junior high school students. Journal of Reading, 1967, 11, 14-21.